From the house of **Amar Chitra Katha** and **Tinkle**

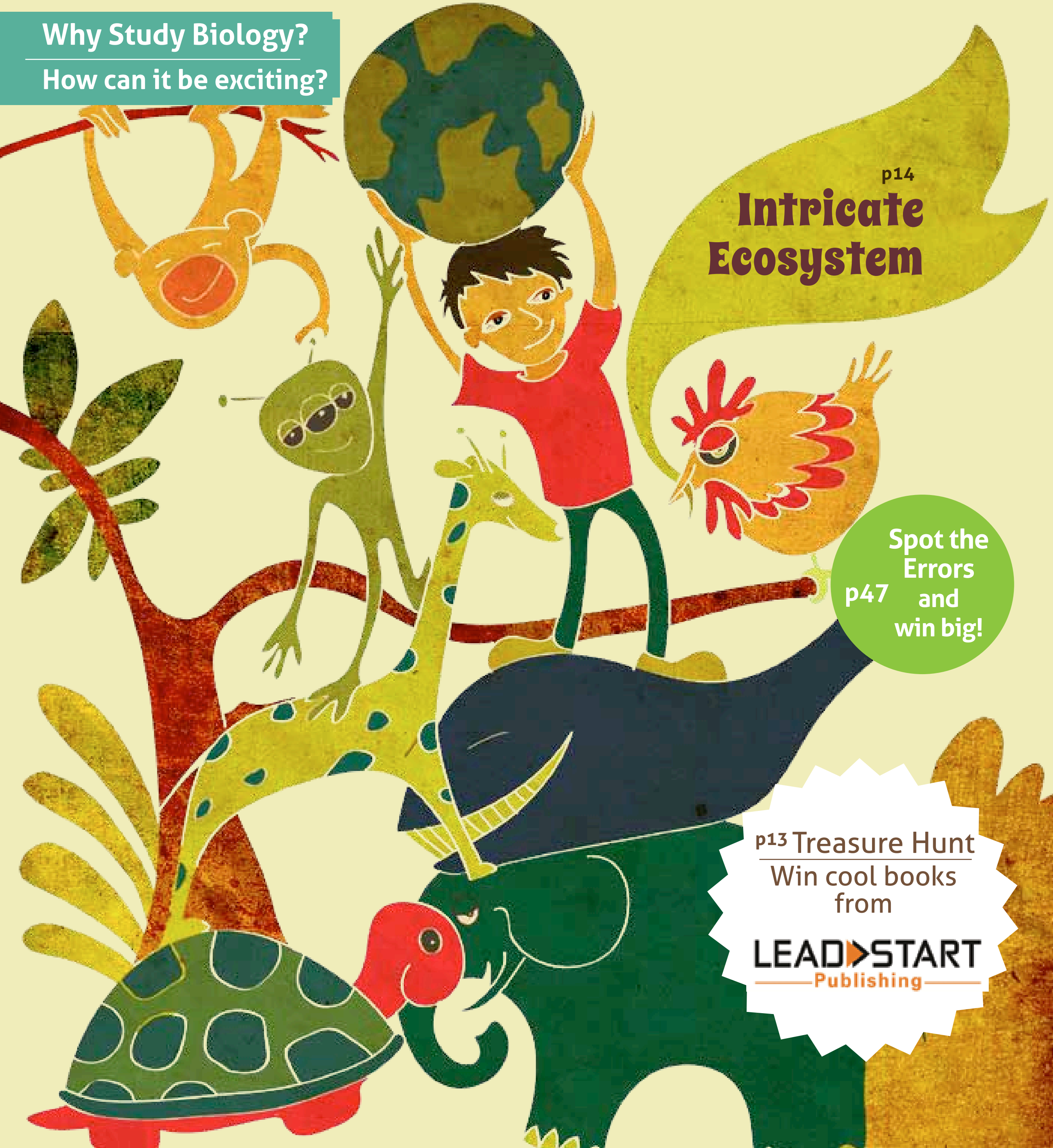
BRAINWAVE™

SCIENCE IS JUST A GAME

Vol. 02 Issue 07
July 2013
48 pages
8-15 years
₹60

Why Study Biology?

How can it be exciting?



p14
Intricate Ecosystem

p47 **Spot the Errors and win big!**

p13 Treasure Hunt
Win cool books from
LEADSTART
Publishing

The Study of Life!

Dear young readers,

Some think that biology is boring. But, we think that biology is a mystery, a mystery that is even bigger and exciting than outer space. It is full of surprises and exciting discoveries.

Thinking, working, digestion etc. seem natural. But, how does everything work so perfectly? Think about how amazing the human body is. Think about how life is possible. How are you here? Is immortality possible? Can mutants exist? How do trees live for hundreds of years? How many species inhabit the Earth? Is evolution real or is it just a theory? - Isn't it miraculous?

Biology helps us understand these miracles. To be good at it, you should be interested in it. And that is what this issue aims at.

SK, sasikanth.c@ack-media.com

Cover artwork by Saudamini Tambay

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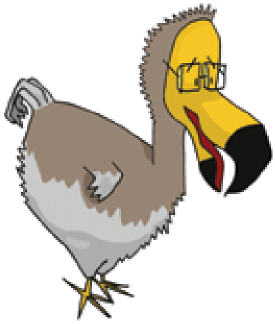
MEET THE SMARTIES



Dr. Dodo: Dr. Dodo is the co-founder of BW Labs and is the last living dodo. He holds a PhD in anachronomaly and parallel universes from the University of Clockwindistan. He invented the Galileo series of time machines.

Skree!: Skree! is the other founder of BW Labs. She loves dangerous experiments. She makes mini black holes before breakfast and has dark matter for lunch.

Arby: Arby is a genius who will grow up to be Aryabhata. He came to the future, thanks to Dr. Dodo's time machine. He is a fan of numbers, banana fritters and robot wars.

Mr X: Mr. X, short for Xavier, was once Dr. Dodo's student. X is as brilliant as Alby and Arby, and by virtue of his knowledge of science, as powerful as Bhoo when the situation demands.

Bhoomi: Bhoomi, a.k.a. Bhoo, is an enigma. No one knows where she is from and how she came into being. She is made up of earth, wind, fire, and water in equal parts. Her alter-ego is Gaia Goel, a world famous science sleuth.

Alby: Alby will grow up to be Albert Einstein However, now, like Arby, he too has been sucked into the future. When he is not researching, he plays the violin.

Read more at www.bwmag.in/meet-the-smarties

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■ ✚

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Words tagged with G have been explained on page no. 47.

★ Win a gift!

Can you hear the globe's heat alarm?

The globe is getting warmer by the minute and no one else but humans are esponsible. Let's take a closer look at global warming. by **Sasikanth C**

Your dad's car is parked outside, right under the sun. What happens when you want to go for a drive in it? The car is unbearably hot due to the heat trapped in it, right? That is exactly what is happening to our planet!

The earth can support life due to greenhouse gases such as carbon dioxide, water vapor, nitrous oxide and methane that trap heat and light from the Sun in the Earth's atmosphere.

Had it not been for these gases, the earth would have been freezing, or burning. Freezing, because at night we would have no source to keep it warm. During the day, especially during summers, it would be burning because there would be no atmosphere to filter the Sun's rays. People, plants, and animals would be exposed to all heat.

Without the gases, life would not have been possible. But now, because there are too many green house gases being released into the atmosphere by humans, the Earth is getting unusually warmer.

Due to this, many countries across the world are facing drastic climatic changes in shorter spans of time. It is believed that global warming is not reversable. But we if try, we can stop it. ■

Artwork by Saudamini Tambay

Can you tell us what we can do to prevent global warming?
Send in your answers to brainwave@ack-media.com and win surprise gifts.

Taste and Smell

by **Kayomarz Bacha**

Some foods taste great, some don't. We know that it is because of the tastebuds on our tongue. But, is there a connection between our nose and the taste of food? Let's find out.

To do this you will need: Two pieces of candy (of same size and shape so you can't tell the difference, but distinct flavours)

First, close your eyes and jumble up the pieces of the candy in your hand so you don't know which is which. Hold your nose, keep your eyes closed and eat any one. Drink a little bit of water and eat the other. You may not be able to tell the difference between the two! When you release the nose, you will have sudden burst of flavour.

Why do you think this happens? Research and email to brainwave@ack-media.com The best entry will win a surprise gift!

The BW Student Board members work with our editorial team and make a difference to the magazine.

In addition to this, their work is published in the magazine and they get to lay their hands on all BW products before anyone else - for free!

At the end of their tenure, we award them with certificates and an honourarium of Rs. 1250 each.

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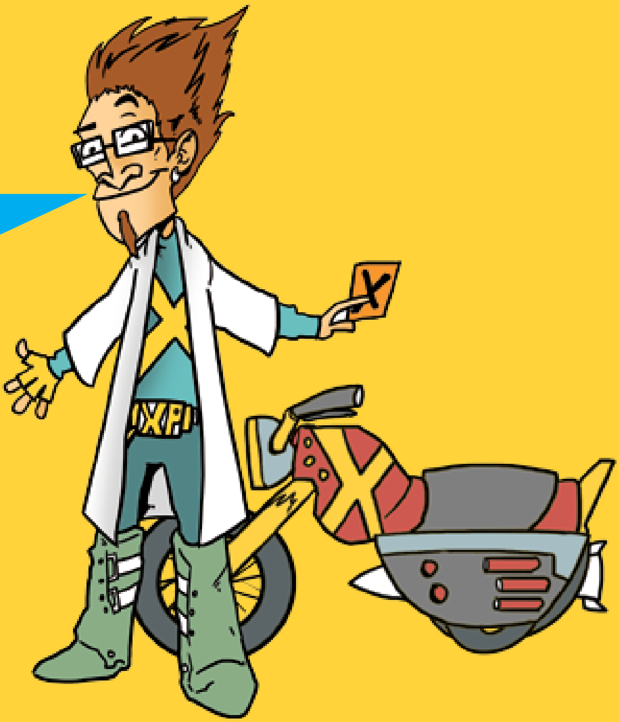
www.bwmag.in/student-board

BW STUDENT BOARD



Join us on our fun-do video channel as *Mr. X* performs some amazing experiments and *x-plains* the science behind them.

Mr. X will perform and publish your experiments too! Just email them to brainwave@ack-media.com

YouTube

www.youtube.com/Brainwavemag

Artwork: Abhijeet Kini

Colour Changing Carnations

by **Kayomarz Bacha**

You will need:

- A carnation / any white flower (available in your garden or at a florist)
- 2 plastic glasses
- Blade / cutter
- Red / blue Ink
- A jar of water

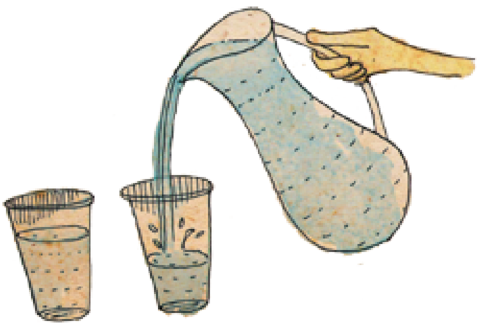
Caution

Handle the blade / cutter carefully. Do not play with it.

METHOD:

Step 1

Take the 2 plastic glasses and fill them half with water.



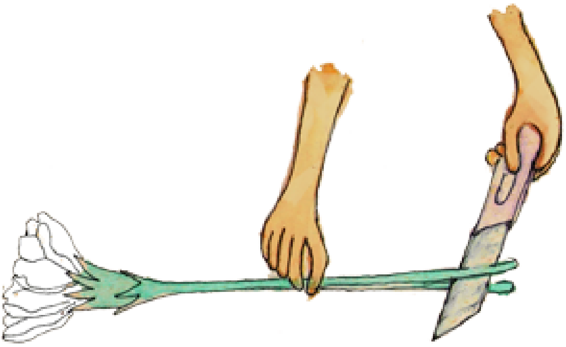
Step 2

Add a few drops of ink to any one of the glasses.

Artwork by Pooja Bhatt

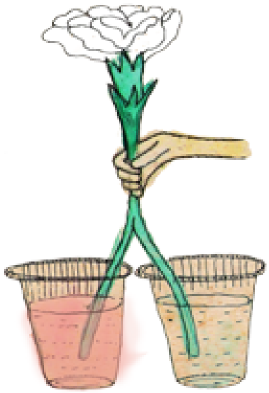
Step 3

Carefully, cut the stem of the flower vertically, upto half its length. Do this strictly under adult supervision.



Step 4

Insert each end of the cut stem in a different glass.



Step 5

Place the glasses and the stem in a little sunlight.

Wait for 24 - 48 hours and observe. Half of the flower will change its colour!

What is capillary action and what is the science behind it? Research and email your answers to kayomarz.bacha@ack-media.com

The most detailed and fastest entry will win a free Amar Chitra Katha comic!

Why does this happen?

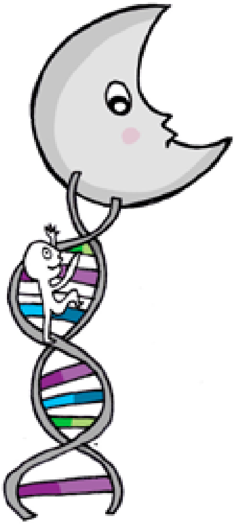
A plant uses water to keep its roots, stems, leaves and flowers healthy as well as to prevent them from drying and wilting. The water also carries dissolved nutrients throughout the plant.

A plant gets water from the ground. This means that it has to transport the water from the roots, up and throughout the rest of the plant.

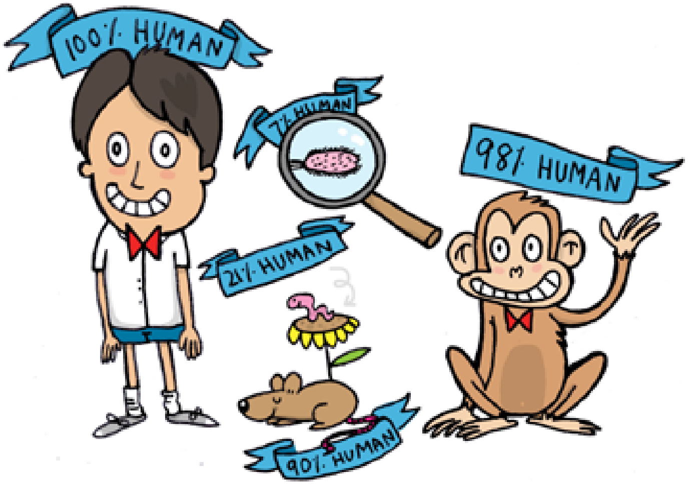
In this case, the colour of the carnation changes because the coloured water moves up the stem, to its petals. This process, by which water moves through the plant is called capillary action.

Note: Do not use scissors to cut the stem because the stem will be crushed and its ability to absorb water reduces. ■

One Albino rabbit, Alba, was injected with the bioluminescent gene of a jelly fish. While she looked like a regular rabbit during day, under certain lights, Alba glowed green!



If you unwrap all the DNA in all your cells, you could reach the moon 6000 times!



Genetic similarity: human beings share 7% of genes with E. coli bacterium, 21% with worms, 90% with mice and 98% with chimpanzees.

Artwork: Alicia Souza

BANG BANG, HERE COMES THE HUNGER PANG!

by **Srinath Perur**

Artwork:Saudamini Tambay

Arushi Joshi asks -
Why do we get hungry and how do we know that we need to eat?

Our body needs food to get the energy to keep going. Through hunger, our body reminds us to eat.

But what exactly makes our stomach growl? It is only in the last fifteen years that we have started to find out the complex processes behind this.

Different parts of our body communicate through chemical messengers known as hormones. Many such hormones are involved in making us feel hungry or full.

When our stomach is empty for a while, cells in its upper part produce a hormone called ghrelin. When the brain senses ghrelin in the blood, it produces another hormone called orexin.

Thus, the stomach knows that it should contract, giving us the sensation of hunger, and making those growling noises.

Ghrelin also improves our sense of smell and makes food look more tempting.

Scientists gave some ghrelin to rats and observed that their noses twitched more and they started sniffing around. And when they showed pictures of pizza, people who had been given ghrelin became quite desperate for the real thing.

Once you finish eating, other hormones are released, signaling that it is time to stop feeling hungry. One of the harmones is leptin, released by fat cells in our body, which makes us feel satisfied with what we have eaten. We normally stop eating well before our stomach is stuffed (or at least we should).

Because of harmones, our body is also aware of if we are sleeping or exercising or tired. It takes all this into consideration before making us feel hungry again. ■

Have a burning question? Email us at *brainwave@ack-media.com* with 'Ask Us Why' as the subject.
The best question will win the latest Amar Chitra Katha animation CD!

EVOLVING WITH CHARLES DARWIN!

Written by : Priyanka Talreja
Artwork by : Parvati Pillai

Charles Darwin was born to the doctor and financier Robert Darwin, and his wife Susannah Darwin in 1809. He was the fifth of six children in the family. Right since birth, Darwin's future was certain as he belonged to a long line of scientists.

In October 1825, at age 16, Darwin enrolled at University of Edinburgh Medical School along with his brother Erasmus. Two years later, Charles Darwin became a student of Arts at Christ's College, Cambridge.

Eventually, Darwin realised that his interest lies in natural history rather than medical studies. Influenced by his cousin, William Fox, he took up the hobby of collecting beetles.

Of course, this upset his farther immensely.

On the fine evening of 29 August 1831, Darwin received a letter from one of his botany professors, John Stevens Henslow. The letter invited Darwin on board a two year voyage, HMS Beagle as a naturalist. The voyage would survey the coastline of South America and give Darwin the chance to collect various specimens while studying their habitat. As you can guess, this did not go well with Darwin's farther.

After much persuation, Darwin's father agreed to fund his voyage. The voyage, HMS Beagle left the coast of England on December 27 December 1831. It was on this voyage that Darwin began reading Charles Lyell's Principles of Geology and was highly influenced by them. This book argued that the present itself is the key to the past. Thus, all geologic changes are nothing but a steady accumulation of minute changes that occur over enormously long spans of time.

BEFORE!
EARTHQUAKE
AFTER!

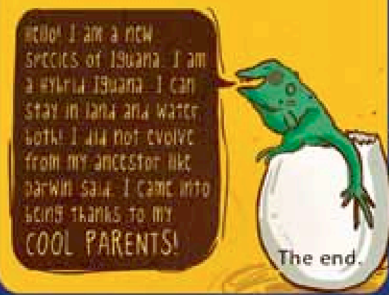
Keeping this concept in mind, Darwin began collecting various species and observing patterns. This voyage lasted for 5 years and by the end of it, Darwin had a 770-page diary, wrapped up 1,750 pages of notes, drew up 12 catalogs of 5,436 skins, bones, and carcasses!

During the voyage, Darwin had observed similarities among species all over the globe. This observation led him to believe that all species had gradually evolved from common ancestors and thus, after reaching home, he proposed the Theory of Evolution.

He also stated that species survived through a process called natural selection - species that successfully adapted to the changing requirements of their natural habitat thrived, while those that failed to evolve and reproduce became extinct.

Darwin's theory faced much opposition as people of that time firmly believed in the Bible. It was a given that God makes all living things.

Controversies about Darwin's theory exist even today. What is true and what is not, dear reader, you have to research and conclude for yourself!


Hello! I am a new species of Iguana. I am a hybrid Iguana. I can stay in land and water both! I did not evolve from my ancestor like Darwin said. I came into being thanks to my COOL PARENTS!

The end.

A laboratory-grown kidney makes waves

Researchers at Boston's Massachusetts General Hospital have created rat kidneys in the lab!

They took a rat kidney and washed away its old cells using a detergent, creating a honeycomb-like scaffold with an intricate network of blood vessels. The kidney was then rebuilt by taking cells from the patient.

After being kept in a special oven for 12 days, it was transplanted into the rodent where it was able to filter blood and produce urine.

In humans, kidneys are one of the most necessary organs for transplantation. With further research, lab-grown kidneys could help humans circumvent the process of waiting for donors. ■

Source: www.the-scientist.com

Image: Howellmark

Long walk home

Paul Salopek has embarked on a journey called *Out of Eden*. The Pulitzer Prize-winning writer is all set to walk the path our prehistoric ancestors took when they wandered out of Africa and migrated across Europe and Asia between 50,000 and 70,000 years ago.

Salopek's evolutionary trail will be blazed entirely only on foot! This exploration project that began in Ethiopia in February 2013 will continue till 2020. From Africa, Salopek will head to Central Asia and China, go northward into Arctic Siberia, travel by ship to Alaska and finally hike down to South America. At 100-mile intervals, Salopek will collect audio and video samples to "create a picture of modern life on Earth along the pathways of ancient migrations."

To read regular dispatches from his journey, visit www.outofedenwalk.nationalgeographic.com ■

Do we need nails?

If a salamander loses its leg, it can grow a new one. Humans and other mammals are not so fortunate. But today, researchers have finally revealed why it is that nails are necessary - we can regenerate the tips of our fingers, as long as enough of the nail remains. Of course, the process is limited compared with the regenerative powers of amphibians^{G}.

Researchers led by Mayumi Ito at New York University have identified that stem cells lying beneath the base of the nail can orchestrate the restoration of a partially amputated finger. However, the cells can do so only if sufficient nail epithelium — the tissue that lies immediately below the nail — remains.

Does this mean that regenerative powers like that of *Wolverine* from *X-men* can soon be real? Who knows! ■

Source: Scientific American

Treasure Hunt!

The Treasure Hunt is here. This time too, it is very simple! There is just one riddle that you need to solve to unearth the theme of the next issue:

Matter, motion, space and time is what I teach,
if you apply force, how far will that object reach?

Push and pull, gravity and energy,
all of these make for a very interesting study.

Clues here ... clues there; a science I am for real,
am the theme for August, guess and win the deal.

……

What are you still waiting for? Get started - top two entries will win two cool books each from Leadstart Publishing. Email your answers to brainwave@ack-media.com with 'Treasure Hunt' as the subject.

LEADSTART Publishing

2 WINNERS GET 2 COOL BOOKS, EXCLUSIVE FROM LEADSTART PUBLISHING!

Be a Smartenstein!

Artwork: Sarthak Sinha

We run many activities and contests in each issue. They can win you many exciting prizes!

Participate in all the activites of an issue, and you can win a merit certificate, the title 'Smartenstein' and a mystery gift - every month!

There activities and contests in this issue are: 'Toy Box **p6**', 'Ask us Why **p9**', 'Third Law **p21**', 'Fan Fiction **p26**', 'Treasure Hunt **p13**', 'Student Board **p13**', and 'Spot the Errors **p47**'.

www.bwmag.in/category/bw-smartenstein

BEST STUDENT
WANTED

Intricate Ecosystem – Mysterious Mr. X demystified

by **Priyanka Talreja**

Mr. X was once a great student who was adored by all his teachers. What then happened to transform him into a villain? Skree! and Bhoo help us find out.

As a student, I remember Xavier as a very lovable and honest boy. I don't know what happened to him later. He developed so much hatred. It often saddens me beyond belief!" exclaimed Dr Dodo.

"I know why, Dr. Dodo," said Skree! "Bhoo and I were discussing this and we have traced his background. It all comes down to, you might not believe us, but biology!"

"Really, how is that?" questioned Dr. Dodo.

"This is how," said Bhoo. "If we take a closer look, everything can be traced down to Biology. It is everywhere. It keeps us alive and helps us understand the things around us."

"But in Xavier's case, some really unfortunate things happened. As a child, he was very happy. He was born and brought up in a village where love flowed like a healthy river. Nothing was amiss."

"That doesn't sound like Mr. X!" exclaimed Alby.

"But then, the lack of balance in the ecosystem across the country affected the villagers," said Skree!

"Huh? I don't quite understand." said Alby.

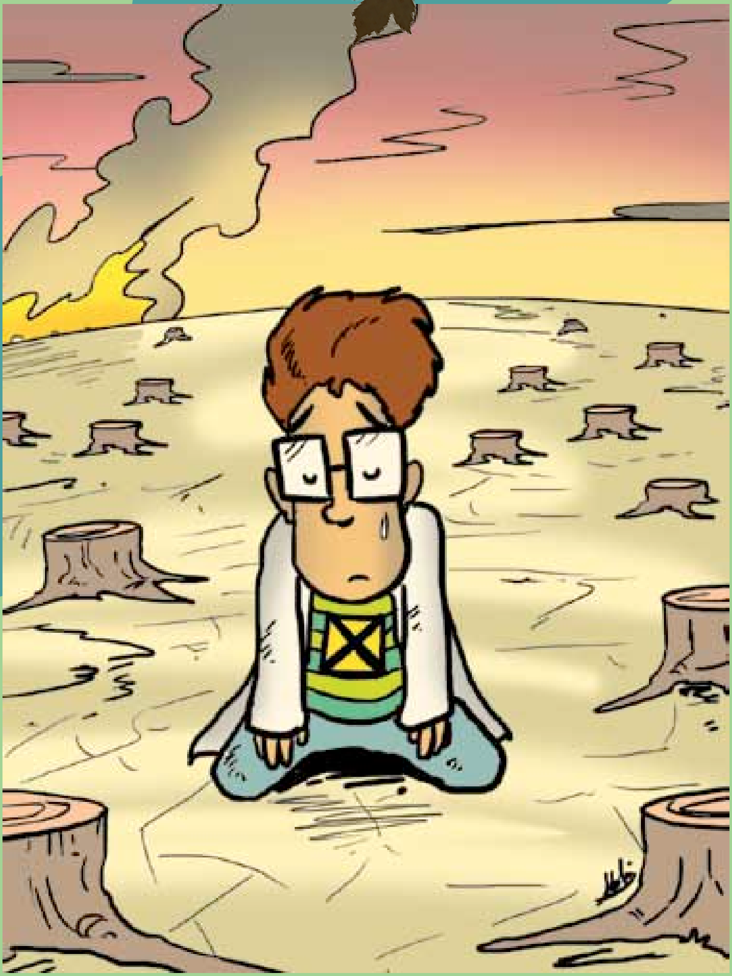
"Let me continue," said Skree! "Xavier's village was a heaven. People shared resources and lived in harmony. But soon, inflation[G] doubled. The prices of LPG (Liquefied petroleum gas) went up two-fold. This meant that gas cylinders to the villagers' kitchens now costed double."

"Before we proceed," interrupted Bhoo, "let us understand why prices increase."

"Governments don't increase prices without reason. When population grows, there is a rise in demand. This makes a particular resource scarce. Say, if 5 people were using LPG earlier, 25 people are using it now. Hence, demand increases. If there is not enough of it being produced, governments need to expend more resources to produce or import LPG. This, in return, causes the price to rise."

Artwork: Abhijeet Kini

“Exactly,” continued Skree “But while the price of LPG went up, the income of the villager did not. This meant that they had less buying power and they were in distress.”



“Soon, not many in Xavier's village could afford cylinders. But, they needed to cook. So, they began cutting down trees for firewood! In a few years, the village that once was heaven on the Earth turned barren."

"Xavier always treated the trees as close friends. Right since he was a kid, he had named each of the trees. He knew which tree was how old and what birds lived in it. Looking at the trees vanishing one after another exposed Xavier to a gamut of negative emotions.” concluded Skree! with a sigh.

“So that is how Xavier to turn into the bad guy?” asked Arby.

“Yes. But sadly, that was just the beginning,” revealed Bhoo “From then on the situation only got worse.”

“Because there were no more trees, the animals and birds that would play with Xavier had all migrated from the village. The lack of trees also meant lack of shade. Temperatures rose drastically in the area.

As the climate became hot, most of the farmers in the area could not get good yield as their crops withered away even before they grew. All the water resources dried up too. And whenever it rained, because there were not enough trees, soil eroded and flods occured.

Due to this the source of income that the villagers once had evaporated. They were now completely helpless.

In a few years, the villagers were left with no option but to leave the village. One by one, they packed their belongings and left.

The neighbouring villages did not accept them as they themselves were barely managing to survive. They could not afford to populate their villages any further. The people from Xavier's village were left with no option but to migrate to cities in search of livelyhood," concluded Bhoo.

"The cities, mind you, are not very kind to illiterate and innocent folks from villages," continued Skree! "Once in the concrete jungle, the villagers did not know what to do. No one would give them jobs as they were not qualified enough. They had to live shelterless, on the streets. Before they knew what was happening, they were all termed as beggars.

Xavier saw how different the people in cities were. They did not have time to pause and help others. It was a rat race! He faced the brutal reality and this was when his heart got filled with hate. He blamed humankind for all the destruction. He now decided – if the ecosystem had to co-exist, humans needed to be taught a lesson."

"Oh my! How did I not see that? I was his teacher!" exclaimed Dr. Dodo.

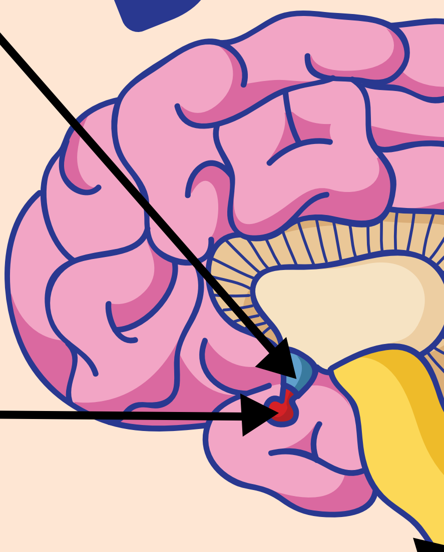
"Who knew cutting down trees could wreak so much havoc!" a horrified Alby spoke out.
"Sad, but true, Alby. You see, our ecosystem is like a vehicle. All the parts are equally essential for things to function properly. If one part goes missing, the system cannot function and it causes a complete breakdown. Everything is interdependent," said Skree!

"I agree that what happened with Xavier was not fair. But this does not give him the right to decide whether or not mankind should exist. We really need to find him before he does something more stupid. Let's go get him," declared Bhoo. ■

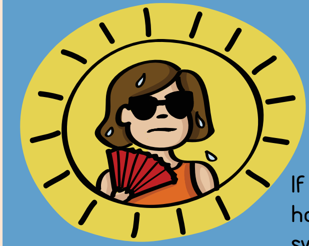
What happens next? Read the Smarties comic on page 38 to find out.

Artwork: Abhijeet Kini

MEET THE BRA



HYPOTHALAMUS



The hypothalamus is like the brain's inner thermostat. This gland knows what the temperature of our body should be.

If our body is too hot, it tells it to sweat. If we feel too cold, it gets us shivering. This way, it tries to get our body temperature back to normal!

PITUITARY GLAND

helps grow taller

This is funny - the tiniest gland in our brain that is the size of a pea makes us grow! The job of the pituitary gland is to produce and release hormones that help in our physical growth. Besides that, it also keeps our metabolism going!

BRAIN STEM

This part of the brain is not that big, but it keeps us alive. The brain stem connects the rest of the brain to the spinal cord. This single stem is in charge of all the functions that keep us alive. Another duty of the brain stem is to control our involuntary muscles — the ones that work automatically, without us having to think about it. It's the brain stem that tells our heart to pump more blood when we’re biking or ask our stomach to start digesting lunch.

breathing air

digesting food

pumping blood

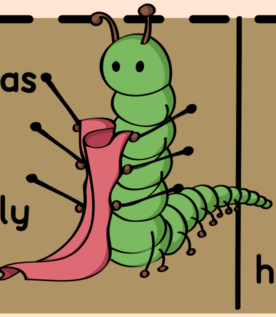
sending messages

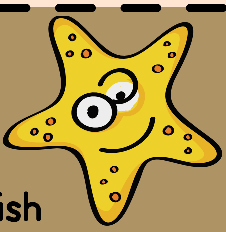
CEREBEL

The teacher in the brain is the Cerebellum. It controls balance, movement and coordination. Thanks to the cerbellum, we can stand upright, keep our balance and move around.

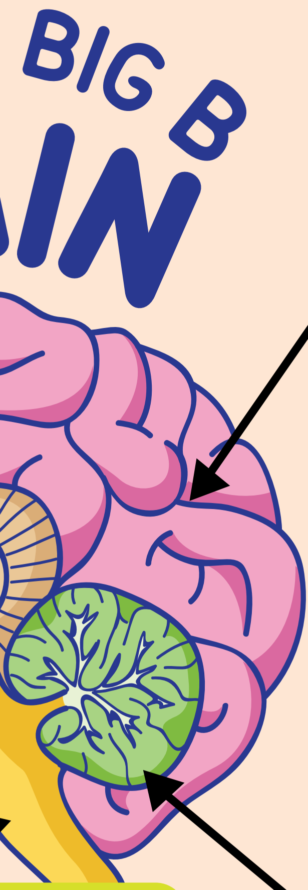
ANIMAL BRAIN FACTS

Silkworm has **11** brains but uses only **5** of them!

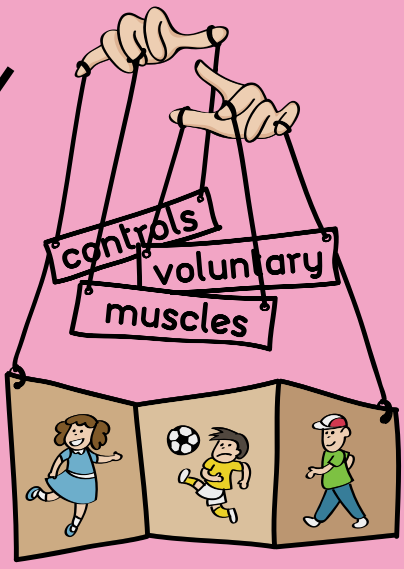




Starfish has NO brain!



CEREBRUM



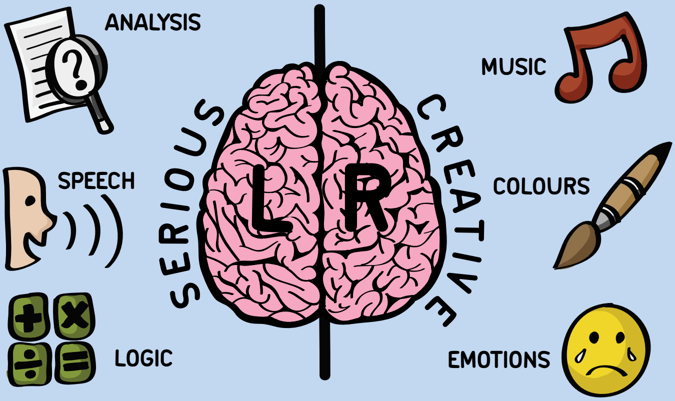
The biggest part of our brain is the cerebrum as it makes up for 85% of the brain's weight. This is a highly important part as it controls our voluntary muscles. These are the muscles that move when we want them to. So without a cerebrum, we would not be able to kick, dance or move on our own.

Cerebrum is also the thinking part as more often than not it is preoccupied with thoughts. We need it to solve problems and figure out the next move in the video game. The other thing that cerebrum does is, store our memory – both, short-term and long-term. So what did you eat last night? And which was your favorite movie last year? Your cerebrum is answering that.

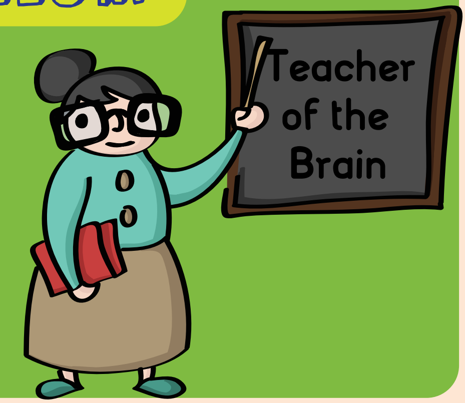
Besides that, cerebrum also reasons. "I better do my homework now or I won't be able to go out in the evening."

That's cerebrum for you!.

Cerebrum is divided into left and right



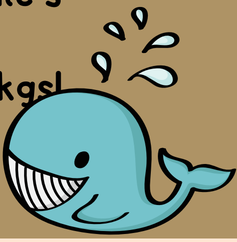
LLUM



Rhinocerous' brain is smaller than its nose!

Ostrich's eye is bigger than its brain!

Blue whale's brain weighs 6kgs!



MiCRO TO MACRO

by **Sarthak Sinha**

What would have become of biology had there not been a device that helped scientists zoom their vision a hundred times over?

The Golden Gizmo award, as far as biology is concerned, goes to none other than the microscope. Without this invention, studying life would have been simply impossible.

Farther of Microbiology

Meet Antonie Van Leeuwenhoek, known as the Father of Microbiology. Leeuwenhoek came from a family of tradesmen and thus, had no family fortune or higher education. It was his natural talent and diligence that led him to make some of the most important discoveries in the history of biology.

At the age of 16, Leeuwenhoek secured a job with a cloth merchant in Amsterdam. This was where he came across his first simple microscope – a magnifying glass mounted on a small stand – that were being used by merchants to take a closer look at their fabric. Leeuwenhoek spent most of his free time pursuing his hobby, which was to grind lenses, making simple microscopes and using them to study tiny objects.

His experiments turned into success when he became the first person to observe and describe single celled organisms. He later noticed that yeast[G] consist of minute organisms. He went on to provide an accurate description of red blood cells.

During his lifetime Leeuwenhoek made over 400 lenses, some of which were no larger than a pinhead! These lenses are now with the Royal Society, who found them to have magnifying powers of up to 300 times! ■

Artwork by Devashree Dhakras

Microscopes and Modern Man

Microscopes have now moved beyond using simple visible light refracting lenses and have advanced many folds.

Electrons, x-rays, and infrared rays are used by far more sophisticated (and expensive) microscopes to detect even smaller structures.

Electron microscopes can resolve viruses, which are far far smaller than any living cell!

Life without microscopes is not possible today as almost every procedure, research of an experiment or analysis of a medical condition requires a microscope. ■

Biologically Gifted

Check out these really awesome super-powers that a lucky few have been gifted by mother nature!

by Bhoo

Migration is a really important for various species of birds. Approximately 1800 of the world's 10,000 bird species are long-distance migrants. Some travel half way across the globe for warmth and food every winter!

The question is how they know where they are going. The answer is "magnetic compass"!

You sure read that right. Some migrating birds have a sense called magnetoreception that helps them travel great distances without losing track, using the Earth's magnetic field as a guide. It took mankind years to invent the GPS[G]. Nature, we have to admit, is quite ahead of us! ■

Mothers are always worried about their young ones. Now, if we step out of the house without a cellphone, mom just panics.

But check out the *slow loris* mothers. They believe that prevention is better than cure. When a young slow loris steps out in search of food, the mother just licks it all over with poison! This way, no one comes close to their newborn and it is free to go where it likes.

Problem solved! ■

Brrrrrrr... It is really cold in Alaska! Imagine the state of the poor *Alaskan wood frog* which lives there.

For months together, the body of the Alaskan wood frog stays completely frozen - like rock solid ice. During this time, all organs in the frog's body, including the heart and the brain stop functioning. As soon as the temperatures start going up, the Alaskan wood frog revives itself back to normal and starts leading a life like it never got frozen! All these are miracles, right? ■

Artwork by Saudamini Tambay

Now it is your turn to give any animal a biological gift! What can you think of? Would you like to make the regular stray dog a little more special, or would it be the exotic creatures of the wild? Surprise us with your answers! Email to brainwave@ack-media.com

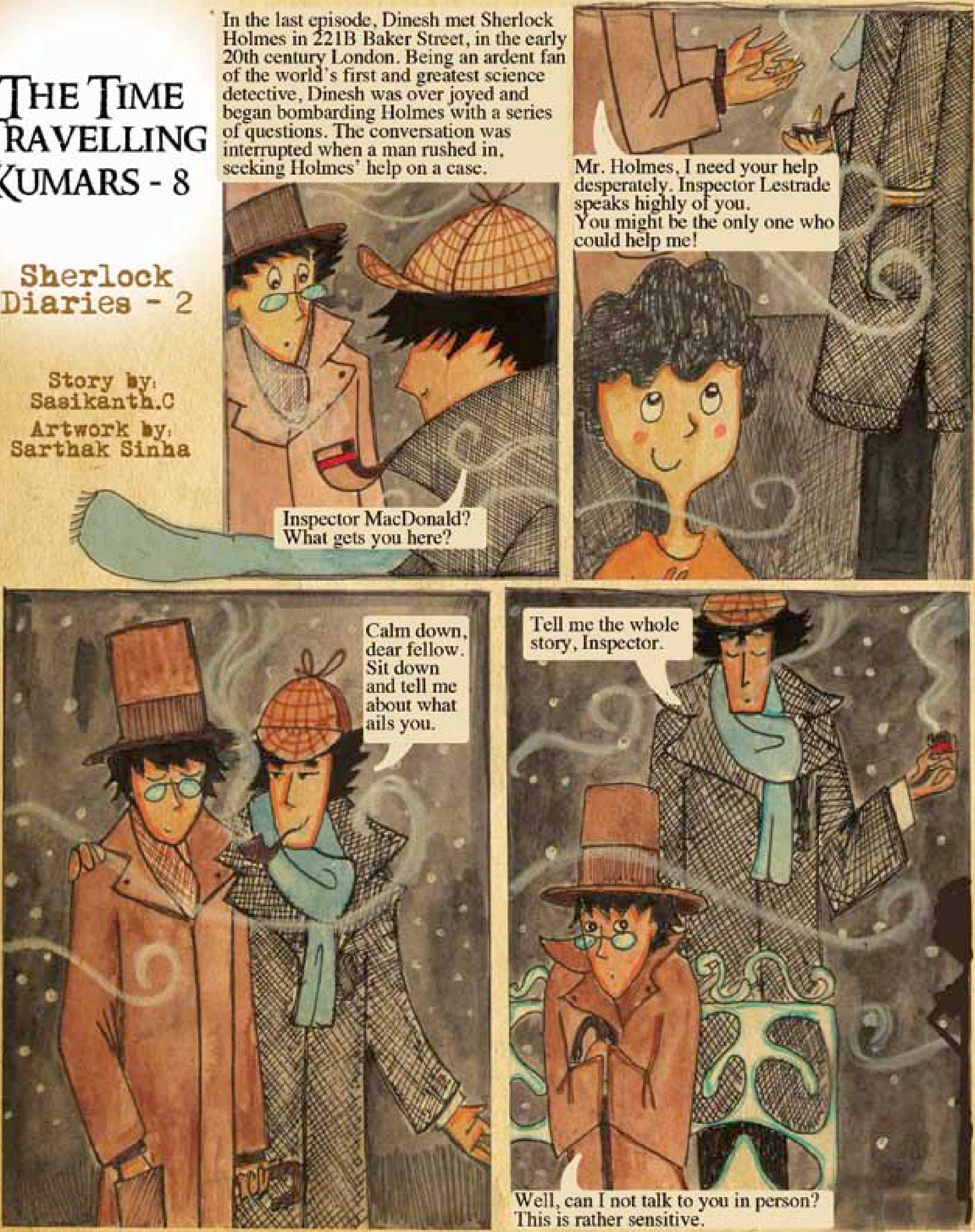
THE TIME TRAVELLING KUMARS - 8

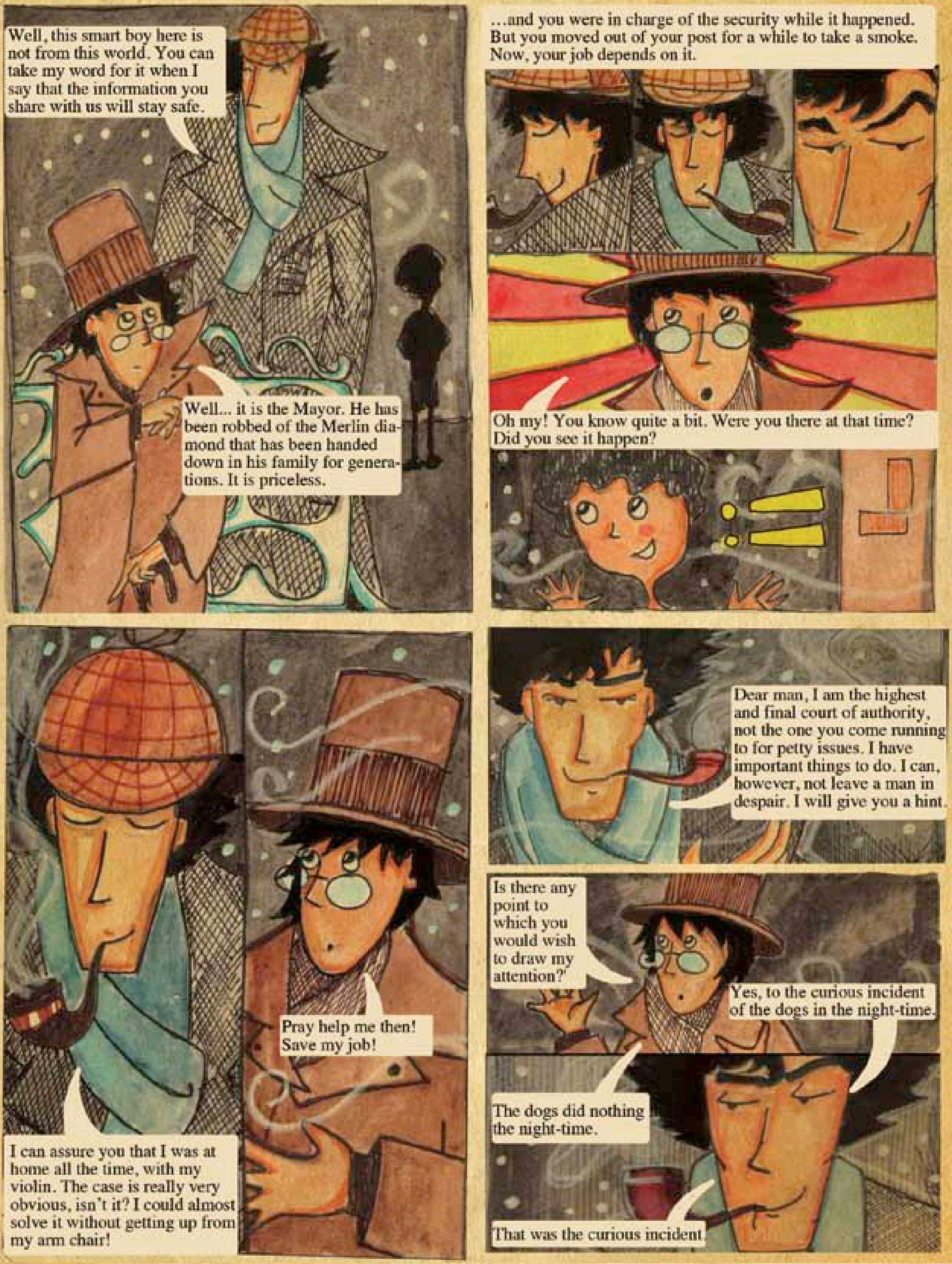
Sherlock Diaries - 2

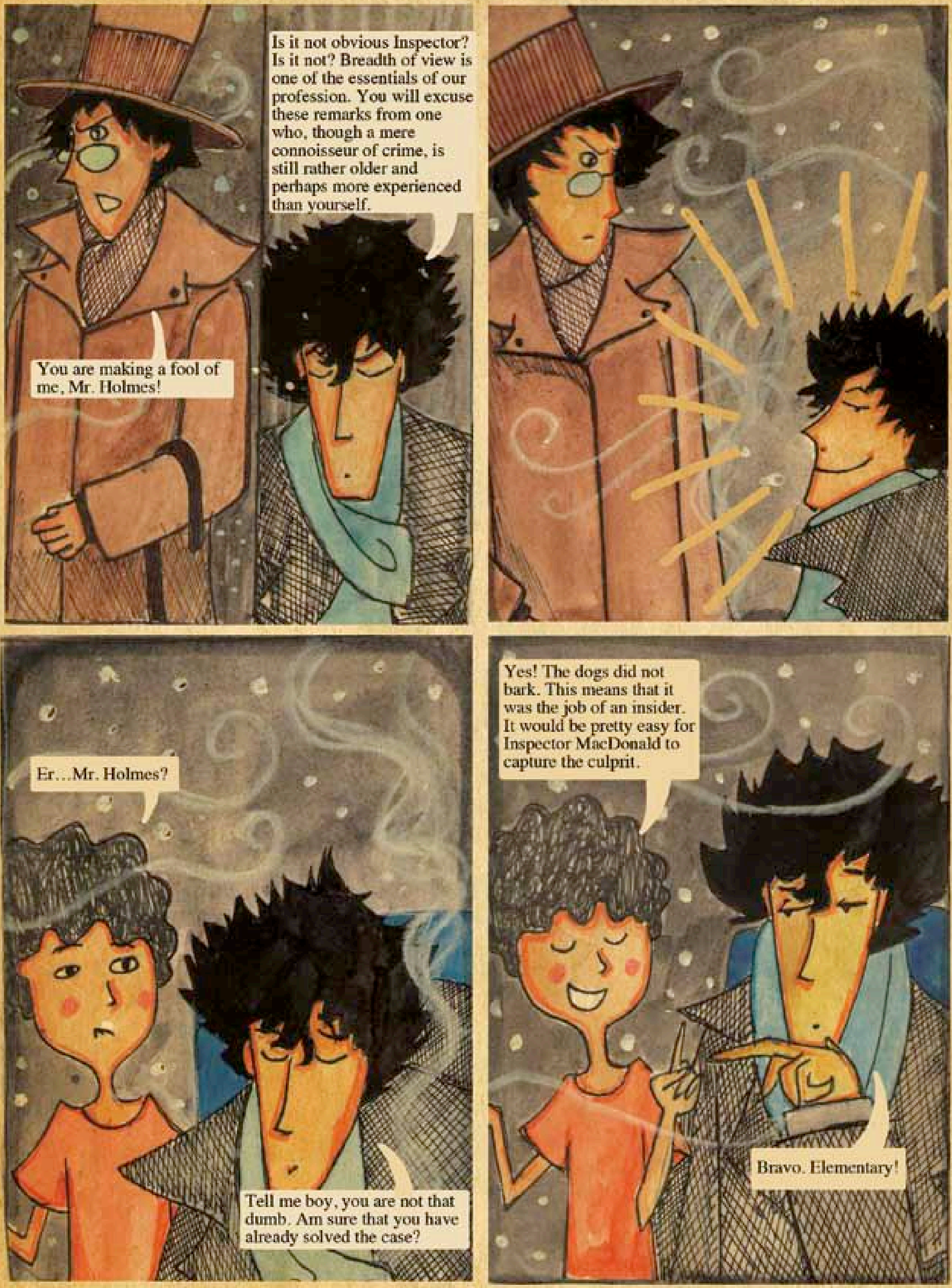
Story by:
Sasikanth.C

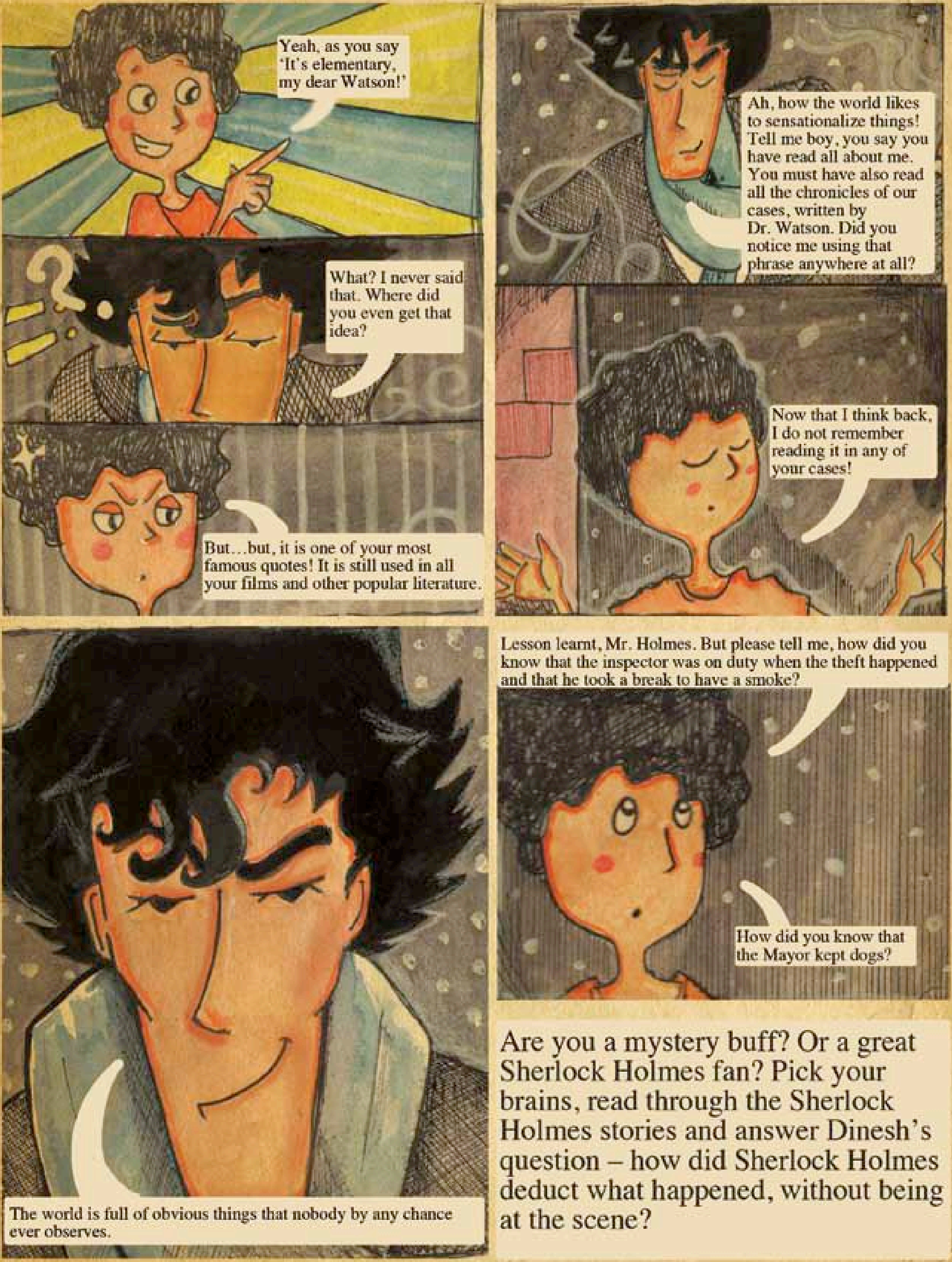
Artwork by:
Sarthak Sinha

In the last episode, Dinesh met Sherlock Holmes in 221B Baker Street, in the early 20th century London. Being an ardent fan of the world's first and greatest science detective, Dinesh was over joyed and began bombarding Holmes with a series of questions. The conversation was interrupted when a man rushed in, seeking Holmes' help on a case.


Inspector MacDonald? What gets you here?
Mr. Holmes, I need your help desperately. Inspector Lestrade speaks highly of you. You might be the only one who could help me!
Calm down, dear fellow. Sit down and tell me about what ails you.
Tell me the whole story, Inspector.
Well, can I not talk to you in person? This is rather sensitive.


Well, this smart boy here is not from this world. You can take my word for it when I say that the information you share with us will stay safe.
Well... it is the Mayor. He has been robbed of the Merlin diamond that has been handed down in his family for generations. It is priceless.
...and you were in charge of the security while it happened. But you moved out of your post for a while to take a smoke. Now, your job depends on it.
Oh my! You know quite a bit. Were you there at that time? Did you see it happen?
I can assure you that I was at home all the time, with my violin. The case is really very obvious, isn't it? I could almost solve it without getting up from my arm chair!
Pray help me then! Save my job!
Dear man, I am the highest and final court of authority, not the one you come running to for petty issues. I have important things to do. I can, however, not leave a man in despair. I will give you a hint.
Is there any point to which you would wish to draw my attention?'
Yes, to the curious incident of the dogs in the night-time.
The dogs did nothing in the night-time.
That was the curious incident


Is it not obvious Inspector? Is it not? Breadth of view is one of the essentials of our profession. You will excuse these remarks from one who, though a mere connoisseur of crime, is still rather older and perhaps more experienced than yourself.
You are making a fool of me, Mr. Holmes!
Er…Mr. Holmes?
Tell me boy, you are not that dumb. Am sure that you have already solved the case?
Yes! The dogs did not bark. This means that it was the job of an insider. It would be pretty easy for Inspector MacDonald to capture the culprit.
Bravo. Elementary!


Yeah, as you say 'It's elementary, my dear Watson!'
What? I never said that. Where did you even get that idea?
But…but, it is one of your most famous quotes! It is still used in all your films and other popular literature.
Ah, how the world likes to sensationalize things! Tell me boy, you say you have read all about me. You must have also read all the chronicles of our cases, written by Dr. Watson. Did you notice me using that phrase anywhere at all?
Now that I think back, I do not remember reading it in any of your cases!
The world is full of obvious things that nobody by any chance ever observes.
Lesson learnt, Mr. Holmes. But please tell me, how did you know that the inspector was on duty when the theft happened and that he took a break to have a smoke?
How did you know that the Mayor kept dogs?

Are you a mystery buff? Or a great Sherlock Holmes fan? Pick your brains, read through the Sherlock Holmes stories and answer Dinesh's question – how did Sherlock Holmes deduct what happened, without being at the scene?

Beginning of the Robot Wars

by **Varun.S.Girimaji,**
Age 10

CHAPTER 1

Agent Varun was in his top secret lab. He had invented a microchip that even our Intel Core i7 and AMD Vision Processor could not equal in intelligence, power and strength.

It was the year 2057. Agent Varun had made a robot out of the chip to prevent it from being stolen. The robot's named Agent 1.0. It has the capacity of 100 regular robots.

Looks wise, it was similar to the 'old computer junk' at home. Its CPU housing was of the typical 2013s type. Its limbs looked like iron bars. It had a slide-in Logitech keyboard and a Samsung smart mouse. The monitor was an LG Studioworks 440si.

It also had a hard disk capable of handling up to 1000TGB of data. The processor it used was of about 150GHz and octa-core. These were great specs, even for 2057. This was the first computer capable such functions.

CHAPTER 2 - Part 1

A little after Agent 1.0 was invented, a robot called Evil Rob 1.0 was invested elsewhere. It was extremely evil and almost matched up to the looks and specifications of Agent 1.0.

On March 12th, 2059, there was a fight between Evil Rob 1.0 and Agent 1.0. Evil Rob fired one of his own add-ons, one of the first UVX guns and Agent 1.0 had a portable Uranium missile. After a 3 day fight, Agent 1.0 finally destroyed Evil Rob 1.0.

Artwork by Devashree Dhakras

CHAPTER 2 - Part 2

It was the 2085, an age in which old fashioned robot fights were outdated. There were highly advanced robots on the scene. Evil Rob 1.0 heir, Evil Rob 3.0 was fighting with Millitary Drone, Agent 1.0's legacy.

The war was severe. Half of the world was destroyed. Yet, this reign of terror brought in by the Evil Rob series didn't end. It is estimated that by 2170, there would be no life left on the Earth. Will there be a superhero to save the day? Wait and see! ■

Email your science fiction stories to *brainwave@ack-media.com*
The best one gets published here and wins a surprise gift!

SOLUTIONS AND WINNERS

Winners of various activities in the May 2013 issue are:
Toy Box: Arthy Shakthibala
Ask Us Why: Revanth Kausikan
Eye See: Arun S
Fan Fiction: Allakky Aniket
Planet Ninjas: Sudheeksha S
Magic Science: Ashitha Joby
Fun-do Band: Scienceinsteins | Chaitanya PVSK
Sci-Q Time: Nachiketa S R
BW Smartenstein: Nachiketa S R *(www.bwmag.in/category/bw-smartenstein)*
Special mention: Pragun K (Origami)

Arun and Sudheeksha get nominated for the BW Student Board - *www.bwmag.in/student-board*

Dear winners (May 2013 issue), email your complete name, age, school, address and phone number to brainwave@ack-media.com to receive your gifts immediately! Do not forget to mention your pincode.

All Fun-do Band captains - ensure that each of your team members visits and registers individually at *www.bwmag.in/fun-do-band* Your team membership will be activated only after that. If you have doubts, write to us at brainwave@ack-media.com

June 2013 winners will be declared in the August 2013 issue.

Letters from Readers

I really really loved Brainwave's May issue as it contained many scientific mysteries. The part which I really loved was the 'Expert Talk' where Dr. Jeff Temple spoke about his love for physics and about the TV show 'The Big Bang Theory'. It is my favourite show. It is about sci-fi, comedy and drama. I mainly like Sheldon Cooper as he sometimes acts like Mr. Bean!
Suraj Krishnan, via email.

Dear Suraj,
Am sure that Dr. Temple would be happy to hear your feedback. Sheldon is my favourite 'The Big Bang Theory' character too! Keep writing.
SK, Editor

Thank you for emailing the January 2013 issue. I liked it very much. The article 'Energy was never this cool' was very interesting. Toy Box activity was very easy. I wish to read Brainwave when I grow up too.
Sudheeksha Sudhakar, via email.

Dear Sudheeksha,
Learning never stops. Even today, everytime I write for Brainwave, I research and learn many new things. Do keep reading and giving us feedback even after you grow up! Glad that you enjoyed the January issue soft-copy.
SK, Editor.

I find Brainwave to be very informative and at the same time, very interesting. It has great illustrations. I find only this magazine attention grabbing. I just love it! I actually missed my April issue. Could you please send a copy of it? And why have you stopped the treasure hunt?
Kashish Hukku-Jani, via email.

Dear Kashish
I have emailed you the April 2013 issue soft copy. Enjoyed and let us know what you think about it.
SK, Editor.

The all-seeing eye

Eyes don't really need the face to see!

by **Priyanka Talreja**

Artwork by Pooja Bhatt

Believe it or not, humans no more not need their eyes to be in their heads. For the first time, scientists have been able to transplant eyes away from a vertebrate's head such that the animal could still see even though there was no direct connection to the brain!

Biologists at the Tufts University School of Arts and Sciences discovered that connecting a sense organ as complex as the eye to the spinal cord is enough to provide vision. The eye doesn't need to be plugged into the actual brain.

The experiment was conducted using tadpoles. The eyes of donor tadpoles were removed and attached to the recipient tadpoles' bottoms. Their natural eyes of the recipient tadpoles were removed. Only the abnormally located eye, connected to the spinal cord, remained.

The tadpoles were then led through a computerised visual training system where sections of water in which they swam were illuminated by either red or blue LED lights. The tadpoles that swam in the red section were issued a mild electric shock.

On further observation, it was noticed that the some tadpoles with the spine-connected eyes learned to swim away from the red light. This means that they learned to associate the red section with the electric shock and moved away to avoid it.

Scientists say that this could greatly help in cases of damaged or missing sense organs.

With the potential ability of eyes being located on any part of our body, mothers might just be able to know our every single move with eyes in the back of their heads! ■

What is food made up of anyway?

by **Jayanthi V**

Different types of food contain different kinds of nutrients. Let's take a look at them.

- Carbohydrate rich foods such as cereals, wheat, bread and potato provide energy. The primary carbohydrates found in our food are present in the form of starch or sugars.

- Fat is found in food items like butter and oil. Fat is often stored by the body as reserve food because it can provide more than double the amount of energy produced by carbohydrates!

Artwork by Saudamini Tambay

- Protein rich foods like milk, eggs, meat and cheese are body-repairing food that fix damage due to wear and tear.

- Vegetable and fresh fruits are the best sources for nutrients like vitamins and minerals, which prevent deficiency diseases.

- Roughage or dietary fiber is obtained from whole grains, pulses, potatoes, fresh fruit, etc. It makes us "feel full" and helps clean out the digestive tract and bowel.

- Water helps in absorbing essential nutrients into our system. ■

Break up that B-U-R-G-E-R

What is the ever-so-yum-burger is made up of? The burger's head is made up of bread which is carbohydrate. Its brain is made up of leafy veggies and that is why it is so smart! Veggies offer vitamins and minerals, remember? The big meaty tongue is made up of meat and is full of proteins. And why is the burger fat? Because it has lots of fat - cheese, butter and Oil. ■

The cell in our body is like the Solar System!

The human body is made up of tiny cells. The cell is pretty much like our Solar System. It is circular with the nucleus and nucleolus in the centre. The nucleus is like the Sun and all other things revolve around it.

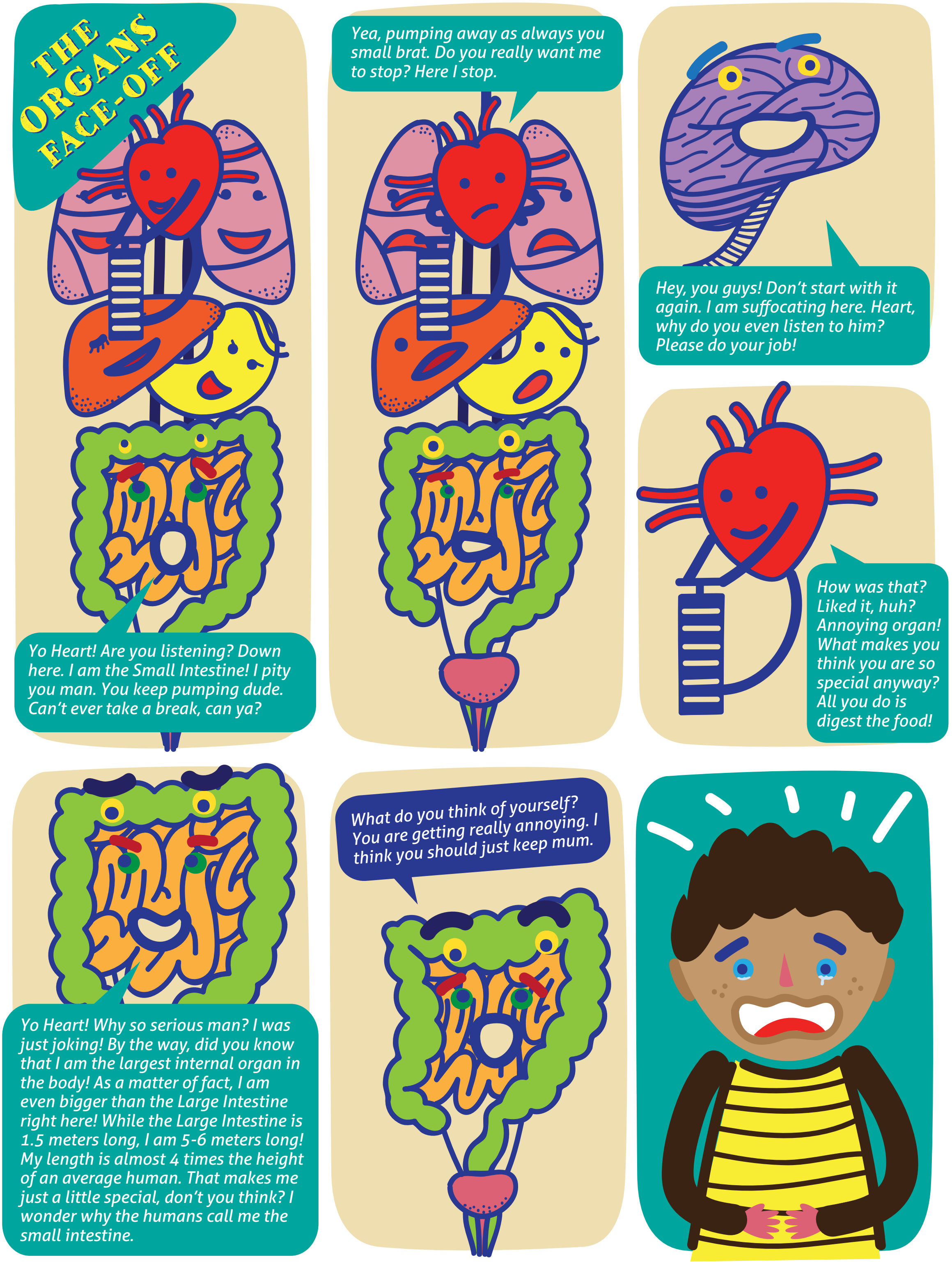
Much like science, the nucleus controls numerous tasks, one of which is to store and organizes our genes. The cell has many tiny residents called mitochondria. These help in respiration and food breakdown. Their main task is to produce energy.

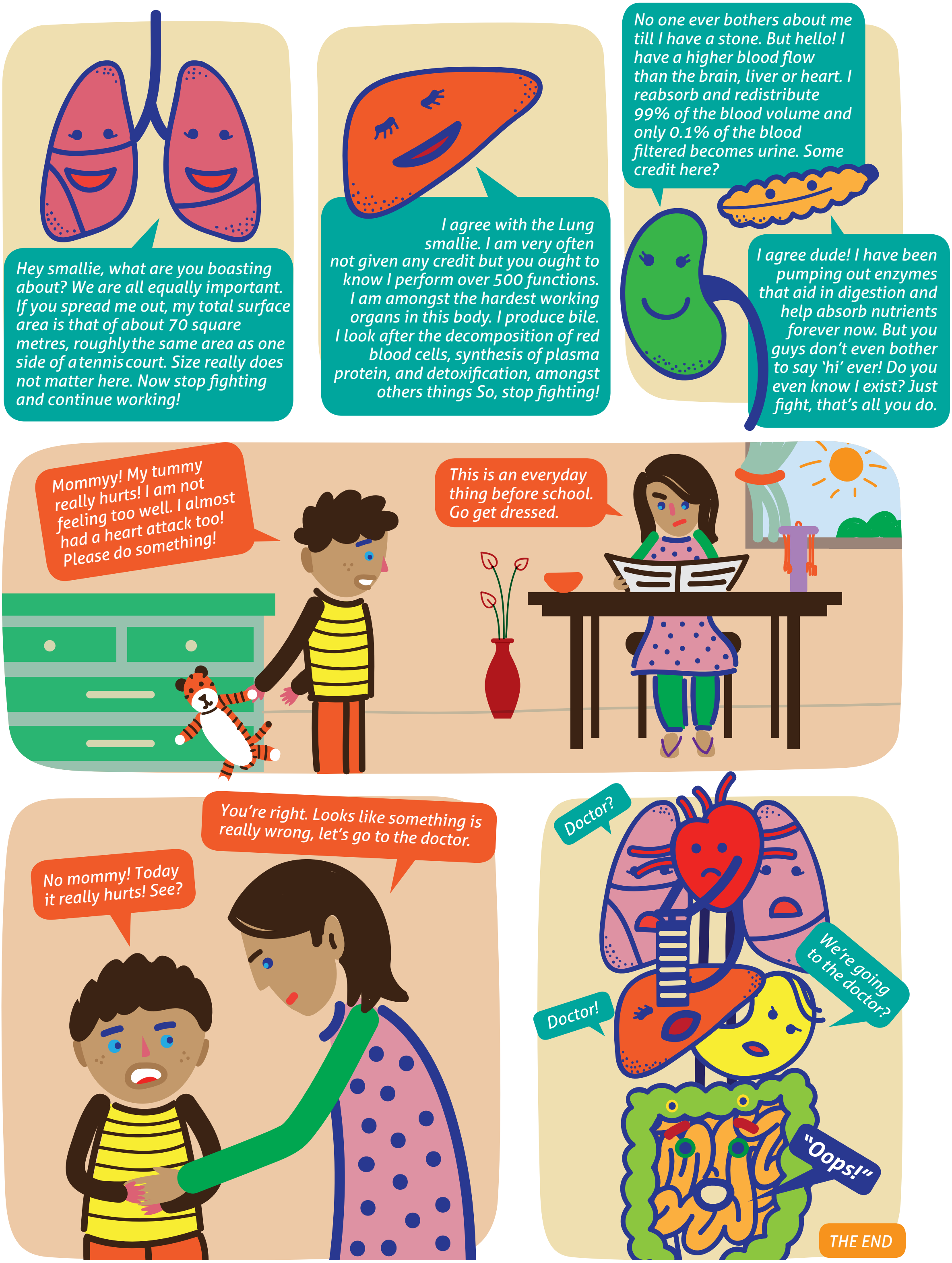
The body of the cell is made up of thick, fat skin called cell membrane. The membrane protects the cell and regulates what goes in and out of. Giving it the shape are microtubules.

Cells contain a fluid known as Cytoplasm. This helps move materials around and dissolves cellular waste, just like gravity keeps all the planets together! The comparison is intriguing isn't it? ■

SCRIPT BY PRIYANKA TALAREJA | ARTWORK BY KASHMIRA SARODE

THE ORGANS FACE-OFF


Yo Heart! Are you listening? Down here. I am the Small Intestine! I pity you man. You keep pumping dude. Can't ever take a break, can ya?
Yea, pumping away as always you small brat. Do you really want me to stop? Here I stop.
Hey, you guys! Don't start with it again. I am suffocating here. Heart, why do you even listen to him? Please do your job!
How was that? Liked it, huh? Annoying organ! What makes you think you are so special anyway? All you do is digest the food!
Yo Heart! Why so serious man? I was just joking! By the way, did you know that I am the largest internal organ in the body! As a matter of fact, I am even bigger than the Large Intestine right here! While the Large Intestine is 1.5 meters long, I am 5-6 meters long! My length is almost 4 times the height of an average human. That makes me just a little special, don't you think? I wonder why the humans call me the small intestine.
What do you think of yourself? You are getting really annoying. I think you should just keep mum.


Hey smallie, what are you boasting about? We are all equally important. If you spread me out, my total surface area is that of about 70 square metres, roughly the same area as one side of a tennis court. Size really does not matter here. Now stop fighting and continue working!
I agree with the Lung smallie. I am very often not given any credit but you ought to know I perform over 500 functions. I am amongst the hardest working organs in this body. I produce bile. I look after the decomposition of red blood cells, synthesis of plasma protein, and detoxification, amongst others things So, stop fighting!
No one ever bothers about me till I have a stone. But hello! I have a higher blood flow than the brain, liver or heart. I reabsorb and redistribute 99% of the blood volume and only 0.1% of the blood filtered becomes urine. Some credit here?
I agree dude! I have been pumping out enzymes that aid in digestion and help absorb nutrients forever now. But you guys don't even bother to say 'hi' ever! Do you even know I exist? Just fight, that's all you do.
Mommyy! My tummy really hurts! I am not feeling too well. I almost had a heart attack too! Please do something!
This is an everyday thing before school. Go get dressed.
No mommy! Today it really hurts! See?
You're right. Looks like something is really wrong, let's go to the doctor.
Doctor?
Doctor!
We're going to the doctor?
"Oops!"
THE END

The Eco-warrior

by **Dr Dodo**

Mohammed Dilawar has been working on conservation biology for the past thirteen years. After completing his Masters in Ecology at the Sikkim Maipal University, he joined the *Royal Society for Protection of Birds* (RSPB) project in 2006.

Mohammed Dilawar has travelled widely across India to observe wildlife, photograph them and study various conservation issues. In 2009, he formed the *Nature Forever Society* for conservation of house sparrows, and flora and fauna found in human habitats.

Photographs by Mohammed Dilawar

What is conservation biology?

Conservation biology is the scientific study of protecting the biodiversity and habitats as well as abiotic factors.

*Abiotic factors are all non-living elements of nature such as mountains, while biotic factors are all living elements found in nature.

What knowledge is necessary for a conservation biologist?

A conservation biologist needs to have a deep understanding of not only biology or life sciences but also other subjects like geography, economics, IT etc. The person needs to continuously stay in sync with the latest developments in and around - be it political, financial, ecological or economical, as everything as an impact on natural ecosystem. S/he also needs to be updated about policy changes at the national and international levels.

What does your typical day at work involve?

A typical day starts in office at 8 a.m. I am done only by 9-10 p.m. I spend most of my mornings in answering emails and planning for the day. In the evening, I answer emails again and review what work I could finish during the day and what I could not. The rest of my time is spent in report writing, desk research, reviving policy, researching, and advocacy.

I also spend considerable time to analyse research findings to devise functional conservation ideas and projects, fundraising etc.

How did this field interest you?

Since my childhood, nature, birds and animals have interested me. When I was younger, I always had sparrows around me. I used to spend hours watching sparrows, vultures and other animals which one could spot in the cities in those days.

We had limited access to books or other resources. However, after satellite tv revolution, channels like National Geographic and Discovery opened up the natural world to me. I would watch the documentaries aired on them for hours.

Noticing my interest in nature and birds, my mother gifted with me my first binoculars and Dr Salim Ali's book. From then on, there has been no looking back.

What according to you is the current state of our ecosystem?

We are passing through one of the most difficult phases - rapid uncontrolled population

growth, climatic changes and the pressure of economic growth on environment. Conservation takes a back seat. This, combined with the type of political situation prevailing in the country adds up to the problems.

Species, habitats and natural corridors of animals are getting destructed at rates higher that we have ever seen before.

In a globalised world, the problems of conservation have compounded. While governments of powerful countries along with their rich multi-national corporations have all the resources at their disposal, conservation organisations are struggling to keep things going.

What will the absence of an animal, plant, sea creature or bird species mean to us?

The planet is an ecosystem which runs when various animals, plants and organisms, big and small, interact. Everything is interdependent and none can survive without the other.

Man is a small part of this system.

What we are presently doing is destructing this intrinsic web, which, once destructed, can never be recreated. We are creating a black hole that will pull us into it one day.

We need to understand that we are the ones who require the plants, animals, oceans, forests and desert. They don’t need us. One fine day, if all this is gone we will not be able to survive, If we go missing one day, nothing will be affected. On the contrary, everything will prosper!

What does biology mean to you? How does studying it help?

Biology is the scientific study of life and living organisms which includes the way they have evolved. It is one of the most amazing branches of sciences.

Anyone whose basic biology is strong will have a much better understanding about the interactions, inter-dependence and conservation issues associated with various life forms.

If our young readers wants to become conservation biologists, what is the career path they should take?

Times have changed and conservation biology offers different avenues today. Conservation has become very reachable and doable. We have engineers who have given up their jobs for this.

One need not do a particular course in conservation. You could be anyone and contribute towards the cause. Every passing day opens up more options. No matter which field you choose, you can link it to conservation. For example, journalists can report environmental issues.

The Time Magazine has named you as one of the 'Heroes of the Environment'. Could you please tell us a bit more about that?

It came as a surprise as I was only 28 years old. To be featured in the list of most influential environmentalists in the world which has featured legends like Prince Charles, Mikhail Gorbachev, David Attenborough, Al Gore, Wangari Maathai and George Schaller - people about whom I had grown up reading isan honour.

However I believe that it is the cause which is bigger than an individual. I am more than satisfied that this brought about more awareness and respect for house sparrow conservation.

……

A bug's life

Insects are more like humans than you would believe!

by **Sasikanth C**

On spotting insects, most people's faces would contort with fantastic expressions as they flay their arms wildly hoping that the creepy-crawlies wouldn't come anywhere near their bodies. However, these bugs lead lives that are as close as to ours as it can get!

Ants

Humans aren't the only ones who have a mid-life crisis and decide to switch careers! Colonies of ants have three main occupations – look after the queen, clean the colony and look for food. Recent research has found that typically, younger ants nurse the queen. But as they grow older, they first graduate to cleaning the colony and then prefer to go out into the world to forage for food. They probably can't deal with the royal tantrums anymore! Ants also tend to stick to their own social groups. However, there are cases of very old nurses and very young foragers, which means that even ants don't always follow the rules.

Photograph: hisham_assaad

Dragonflies

With all our scientific advances and technological knowhow, you'd think that humans were the most adept hunters on the planet. Even lions and sharks seem more dangerous than those glittering dragonflies. However, as opposed to a lion's 75% failure rate and a shark's ability to catch only about half the prey it hunts, dragonflies have a 95% success rate!

Photograph: wikimedia commons

Termites

Humans aren't the only ones hunting for gold. Recent experiments show that termites dig for and stock the yellow metal when they're underground, collecting material for their nests. Researchers took samples of different termite nests and discovered that termite nests near gold sites contained more gold particles than nests that were away from the metal. Scientists suggest that these termite nests could be used as a cost-effective factor to determine the presence of gold in the area!

Bees

Sometimes a strong cup of coffee seems to be our only resource to combat sleep. Humans may not be the only ones enjoying this much-needed jolt in the morning. Bees are attracted to plants that have caffeine. These plants use the caffeine like a drug that keeps the bees coming back for more and in turn, helping the plant pollinate[G]. Experiments also showed that caffeine helps enhance their long-term memory. It changes how the bee's brain responds to learning and memory tasks!

Beetles

Today, if you get lost, all you need to do is whip out your smartphone, and the GPS system will take care of the rest. Before there existed Google Maps, humans used stars to navigate as they travelled through unexplored lands.

Recent evidence suggests that dung beetles use the sky, more specifically the Milky Way, as a map of sorts. Even on clear moonless nights, dung beetles can walk along straight paths by using the starry sky to trace their route! In a planetarium, the beetles were observed under a starry sky, a sky showing only the Milky Way and an overcast sky. The beetles had no problem with the first two skies but found themselves completely lost under overcast sky.

The next time you find yourself lost and abandoned by technology, just find a dung beetle to follow. ■

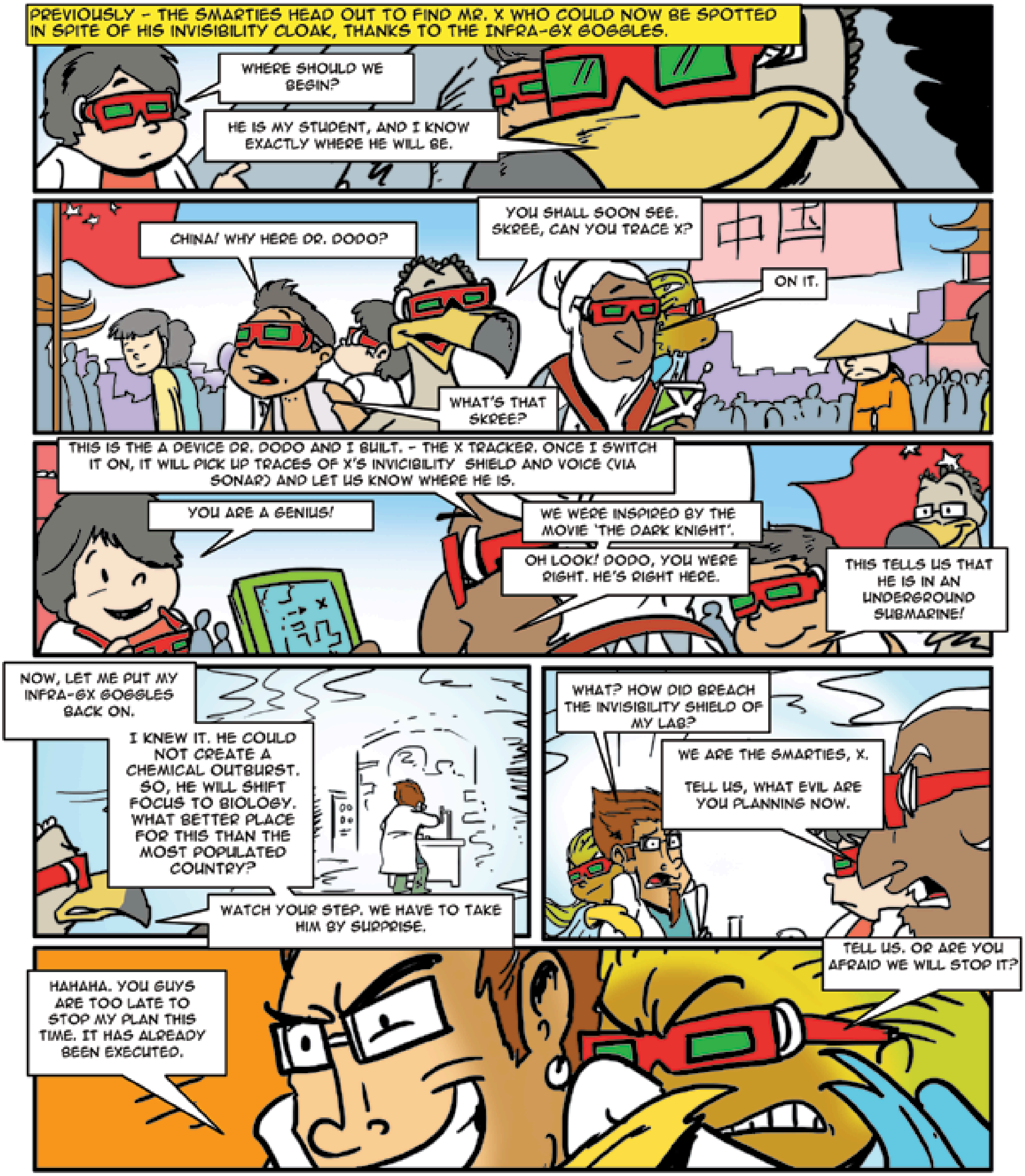
Photograph: wikimedia commons

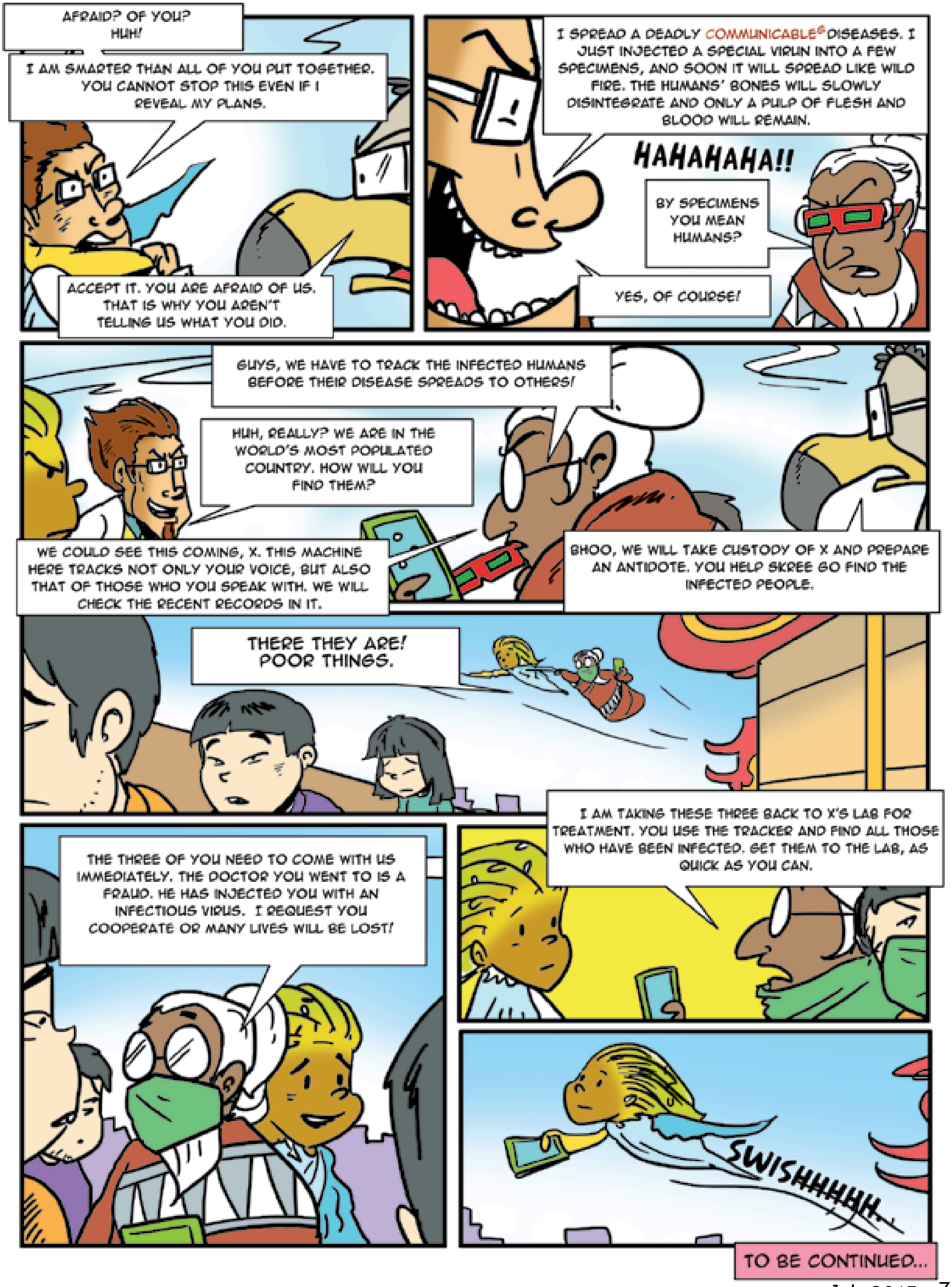
Photograph: John C. Akers jr.

THE SMARTIES

THE DEADLY DISEASE

STORY: JAYADEV CALAMUR ART & LETTERING: ABHIJEET KINI


PREVIOUSLY – THE SMARTIES HEAD OUT TO FIND MR. X WHO COULD NOW BE SPOTTED IN SPITE OF HIS INVISIBILITY CLOAK, THANKS TO THE INFRA-6X GOGGLES.
WHERE SHOULD WE BEGIN?
HE IS MY STUDENT, AND I KNOW EXACTLY WHERE HE WILL BE.
CHINA! WHY HERE DR. DODO?
YOU SHALL SOON SEE. SKREE, CAN YOU TRACE X?
ON IT.
WHAT'S THAT SKREE?
THIS IS THE A DEVICE DR. DODO AND I BUILT. - THE X TRACKER. ONCE I SWITCH IT ON, IT WILL PICK UP TRACES OF X'S INVICIBILITY SHIELD AND VOICE (VIA SONAR) AND LET US KNOW WHERE HE IS.
YOU ARE A GENIUS!
WE WERE INSPIRED BY THE MOVIE 'THE DARK KNIGHT'.
OH LOOK! DODO, YOU WERE RIGHT. HE'S RIGHT HERE.
THIS TELLS US THAT HE IS IN AN UNDERGROUND SUBMARINE!
NOW, LET ME PUT MY INFRA-6X GOGGLES BACK ON.
I KNEW IT. HE COULD NOT CREATE A CHEMICAL OUTBURST. SO, HE WILL SHIFT FOCUS TO BIOLOGY. WHAT BETTER PLACE FOR THIS THAN THE MOST POPULATED COUNTRY?
WATCH YOUR STEP. WE HAVE TO TAKE HIM BY SURPRISE.
WHAT? HOW DID BREACH THE INVISIBILITY SHIELD OF MY LAB?
WE ARE THE SMARTIES, X.
TELL US, WHAT EVIL ARE YOU PLANNING NOW.
TELL US. OR ARE YOU AFRAID WE WILL STOP IT?
HAHAHA. YOU GUYS ARE TOO LATE TO STOP MY PLAN THIS TIME. IT HAS ALREADY BEEN EXECUTED.


AFRAID? OF YOU? HUH!
I AM SMARTER THAN ALL OF YOU PUT TOGETHER. YOU CANNOT STOP THIS EVEN IF I REVEAL MY PLANS.
ACCEPT IT. YOU ARE AFRAID OF US. THAT IS WHY YOU AREN'T TELLING US WHAT YOU DID.
I SPREAD A DEADLY COMMUNICABLE[6] DISEASES. I JUST INJECTED A SPECIAL VIRUN INTO A FEW SPECIMENS, AND SOON IT WILL SPREAD LIKE WILD FIRE. THE HUMANS' BONES WILL SLOWLY DISINTEGRATE AND ONLY A PULP OF FLESH AND BLOOD WILL REMAIN.
HAHAHAHA!!
BY SPECIMENS YOU MEAN HUMANS?
YES, OF COURSE!
GUYS, WE HAVE TO TRACK THE INFECTED HUMANS BEFORE THEIR DISEASE SPREADS TO OTHERS!
HUH, REALLY? WE ARE IN THE WORLD'S MOST POPULATED COUNTRY. HOW WILL YOU FIND THEM?
WE COULD SEE THIS COMING, X. THIS MACHINE HERE TRACKS NOT ONLY YOUR VOICE, BUT ALSO THAT OF THOSE WHO YOU SPEAK WITH. WE WILL CHECK THE RECENT RECORDS IN IT.
BHOO, WE WILL TAKE CUSTODY OF X AND PREPARE AN ANTIDOTE. YOU HELP SKREE GO FIND THE INFECTED PEOPLE.
THERE THEY ARE! POOR THINGS.
I AM TAKING THESE THREE BACK TO X'S LAB FOR TREATMENT. YOU USE THE TRACKER AND FIND ALL THOSE WHO HAVE BEEN INFECTED. GET THEM TO THE LAB, AS QUICK AS YOU CAN.
THE THREE OF YOU NEED TO COME WITH US IMMEDIATELY. THE DOCTOR YOU WENT TO IS A FRAUD. HE HAS INJECTED YOU WITH AN INFECTIOUS VIRUS. I REQUEST YOU COOPERATE OR MANY LIVES WILL BE LOST!
SWISHHHHH
TO BE CONTINUED...

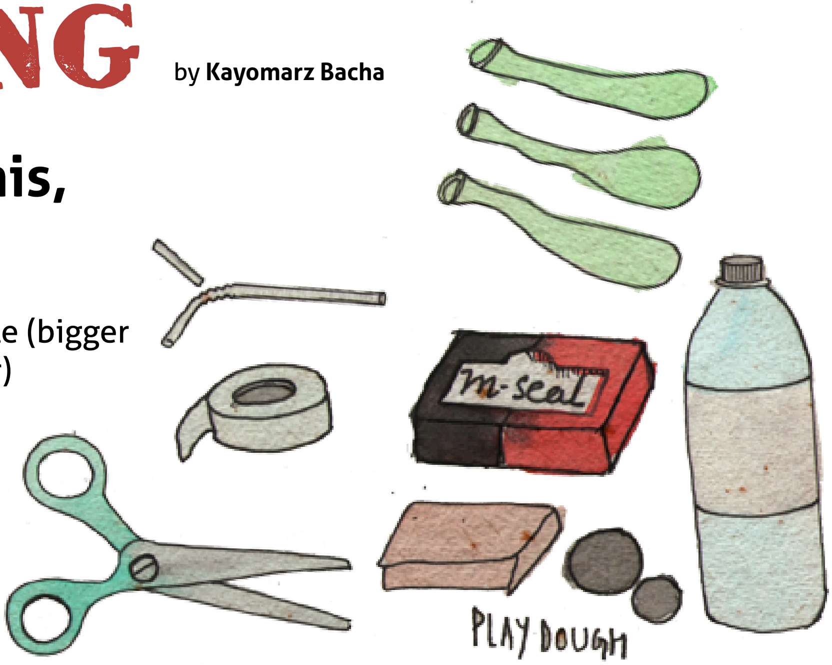
MODEL OF A LUNG

by **Kayomarz Bacha**

Artwork: Pooja Bhatt

To perform this, you need:

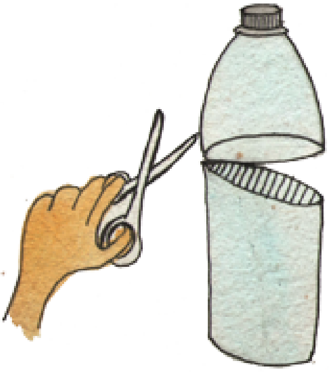
1. An empty plastic bottle (bigger bottle will work better)
2. 3 balloons
3. 1 straw
4. Scissors
5. Cello-tape
6. M-seal or play dough



METHOD:

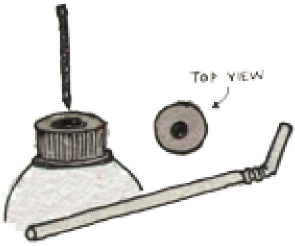
Step 1

Cut 1/3rd of the bottle off from the top.



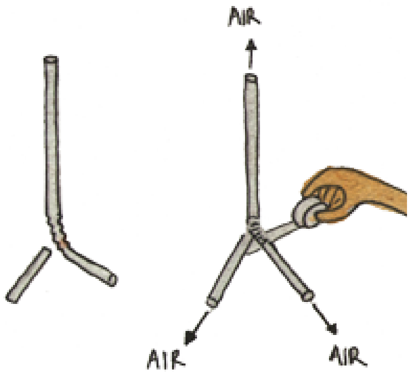
Step 2

Make a hole in the bottle cap - just big enough for a straw to fit through.



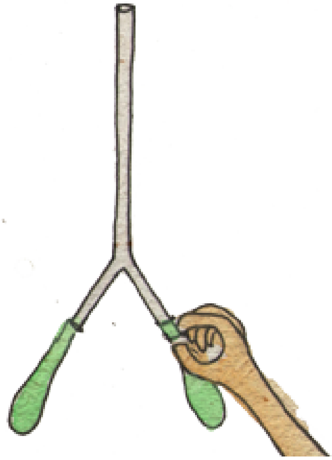
Step 3

Cut and stick the straw with tape as shown in the below image, to make a 'Y' shaped connector.



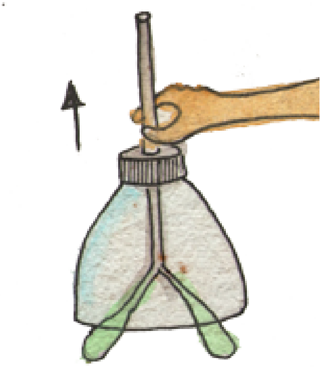
Step 4

Attach a balloon to each end of the 'Y' shaped connector with tape or rubber band.



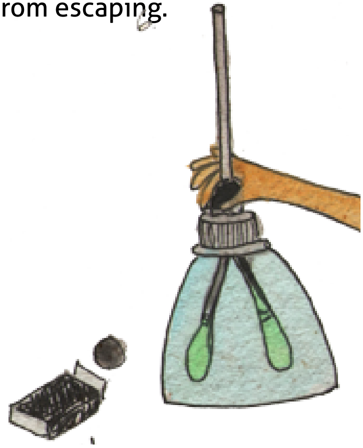
Step 5

Insert the straw through the bottle cap such that the balloons hang inside the bottle.



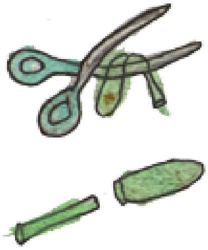
Step 6

Apply the play dough or m-seal between the straw and the hole in the bottle cap to avoid air from escaping.



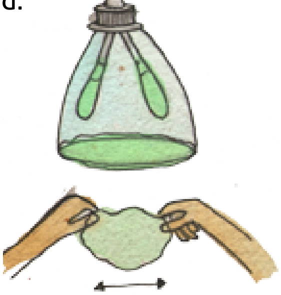
Step 7

Cut the neck of the 3rd balloon off.



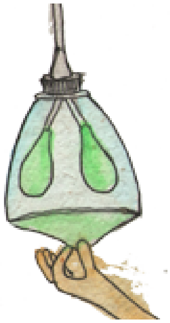
Step 8

Stretch and spread the balloon around the base of the bottle top such that no air escapes. Use a rubber band to hold it in place, if needed.



Step 9

Now pull the balloon that is stretched around the open base of the bottle top as shown, and leave. Observe what happens.



What happened?

The stretched balloon at the bottom acts as your diaphragm. The diaphragm is located below the lungs and is a large, dome shaped muscle that contracts rhythmically and continually.

When we inhale, the diaphragm expands and creates a vacuum, which pulls air into the lungs. The balloons inside the bottle act like our lungs that expand and contract as air goes into and out of them.

When we exhale, the diaphragm relaxes and returns to its dome-like shape, and air is forced out of the lungs.

An exciting DIY, isn't it?

TIME GLIDERS

Join our team of time travellers from 2550 A.D. whose mission it is to discover and learn more about our Universe!

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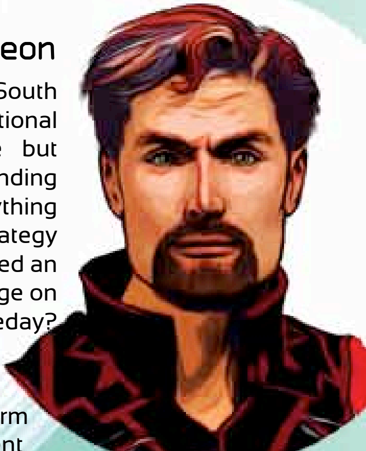
Meet the team

By 2550 A.D., time travel has been perfected.
This lead to the Time Glider project, run by a consortium of science and engineering departments from all over the world. The aim is to gain a better understanding of certain difficult, science-related issues. There are various Time Glider teams, but the first mission belongs to TG-1, the spacecraft commandeered by professor Patel.

Time Gliders Command has one directive: TG teams are assigned to discover and explore, but are under no circumstances allowed to interfere with human history. This may cause uncontrollable ripple effects that may jeopardize the very future existence of the Time Gliders agency!

Professor Patel

Commander of TG-1, and co-founder of the International Time Gliders Agency, he is commonly known as "Prof". Born in Kolkata, India, he boasts several Nobel prizes in the natural sciences. His specialty is quantum physics and string theory frequently causing him sleepless nights. It is no secret that Prof loves hot curry, which, according to him, helps him "to think better".

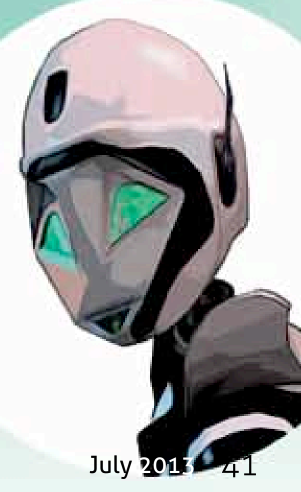


Deon

Pilot, and in charge of security. Born in Pretoria, South Africa, Deon is a new recruit from the International Space Flight Academy, and ready for adventure but tends to be somewhat impulsive at times, finding himself in dangerous situations. Deon loves anything that is fast. As a kid he was a champion in strategy games on the Play Station 999, and developed an interest in human history. Who knows, his knowledge on this subject might even come in handy someday?

Liz

Engineer and data analyst. Born and raised on a farm in Australia, she loved helping her dad fix equipment rather than playing with dolls. She sometimes got into trouble at school after altering machines to "improve" them without permission! Liz developed a special interest in nanotechnology and endeavors to one day receive the Nobel Prize in this field.



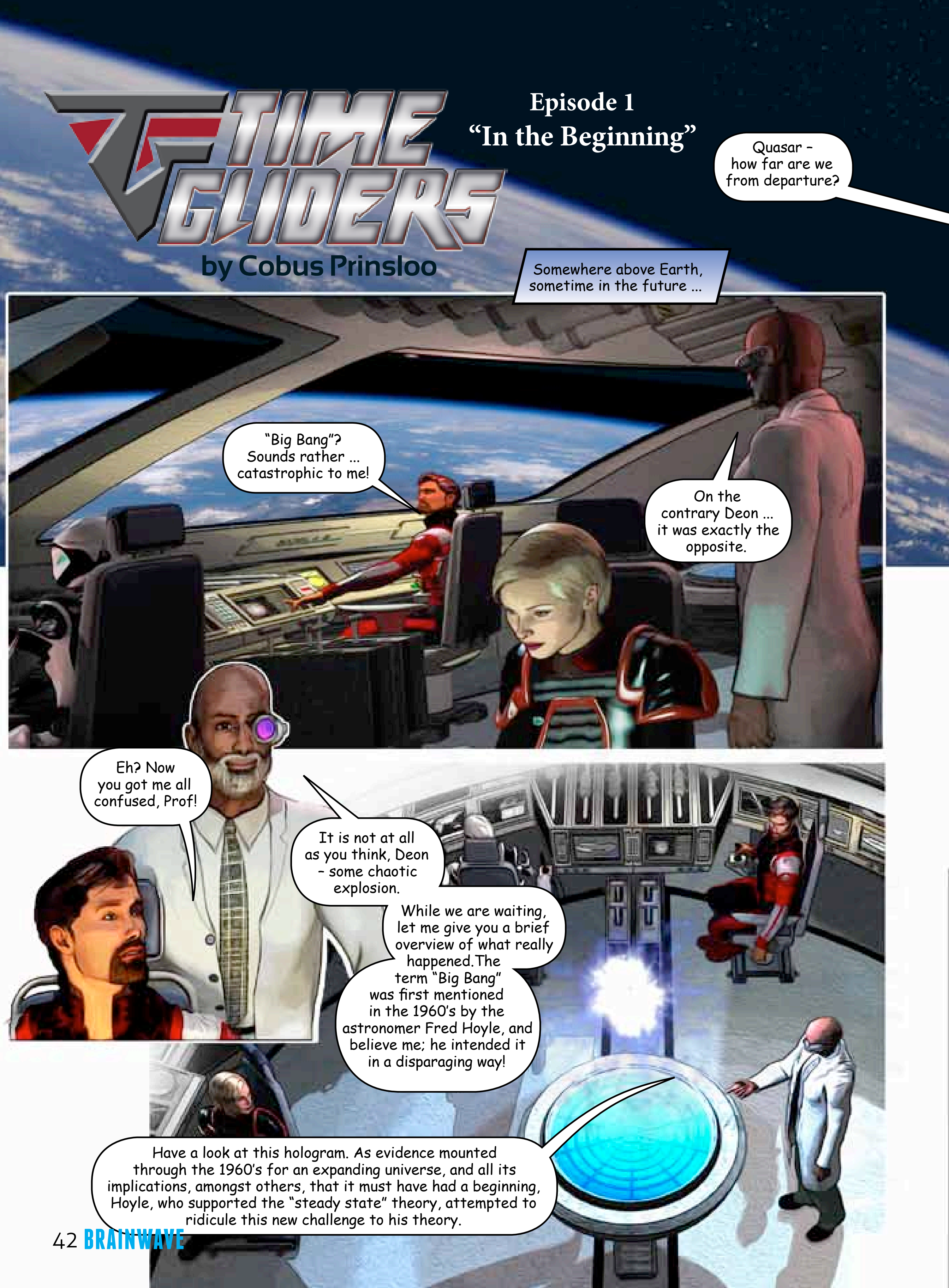
Quasar

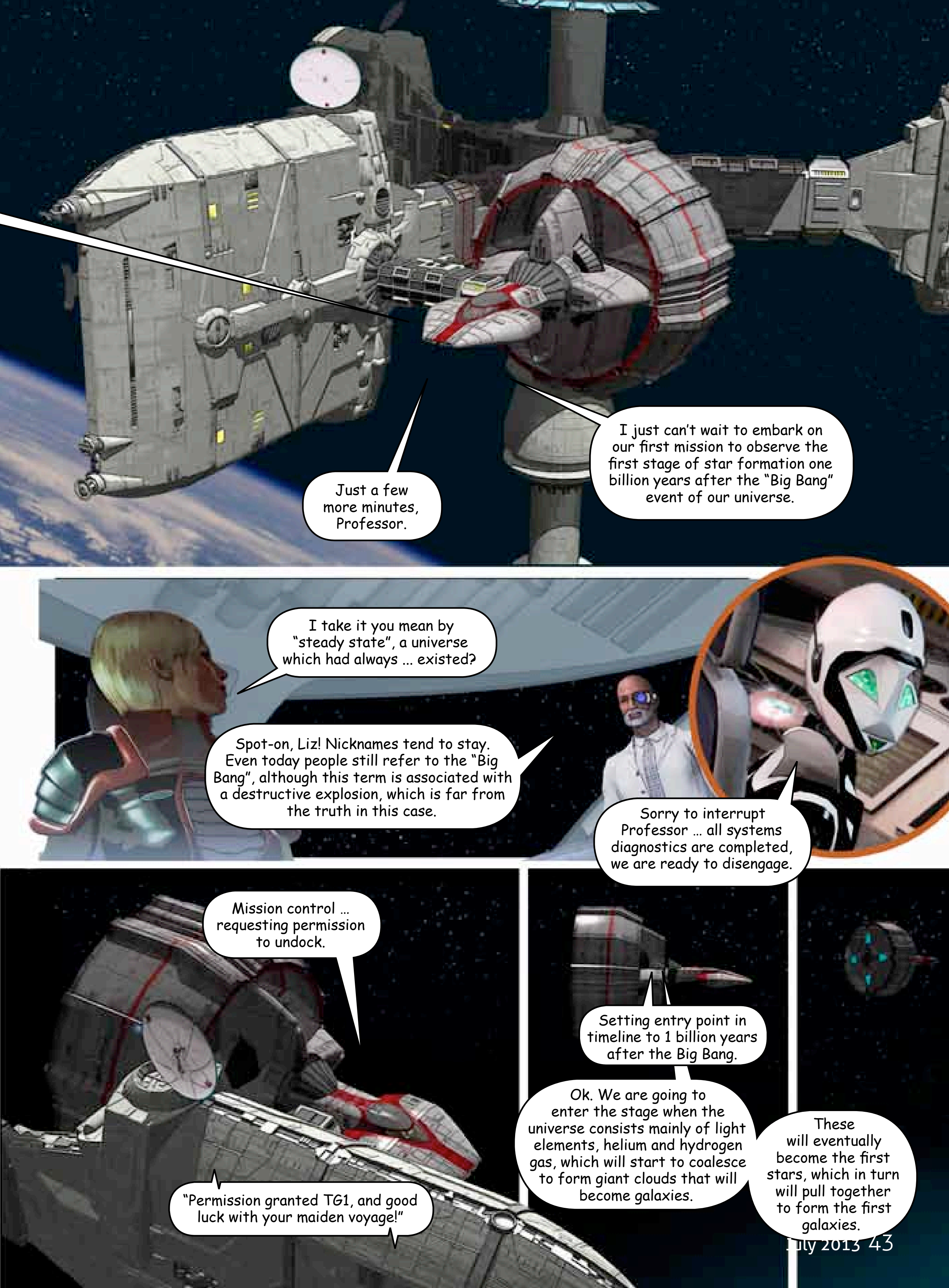
Logistics and timeline navigator. Quasar is, well, basically from all over the world. He was conceived in a Japanese robotics laboratory, but developed further in India. Most of his parts are from China, but he was finally assembled in Germany. Having a limited capacity to experience human-like emotions, it is no wonder he is wrestling somewhat to find his own identity. Quasar has a special taste for Castrol lubricants as it helps keep his joints in tip-top shape.

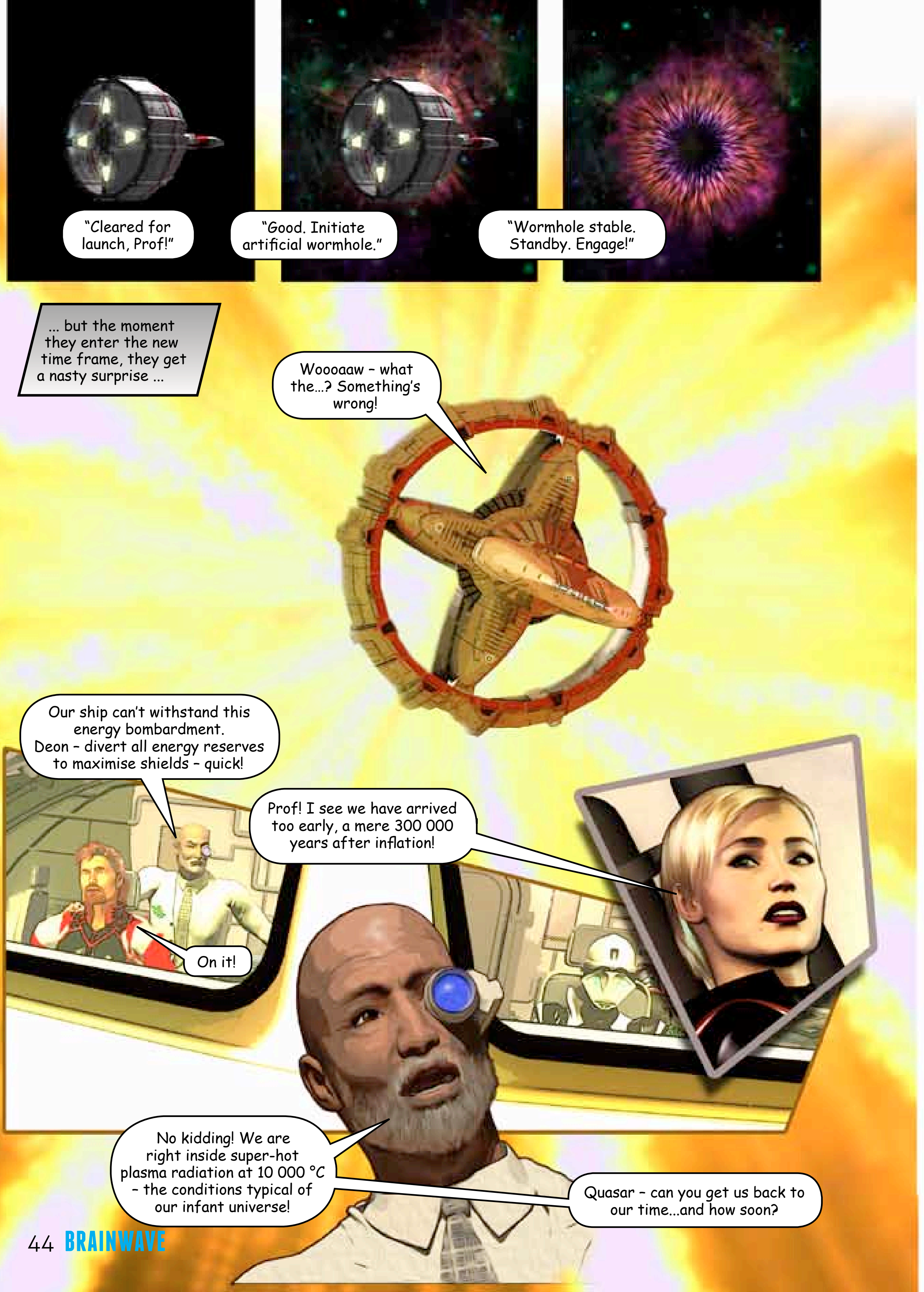
TIME GLIDERS

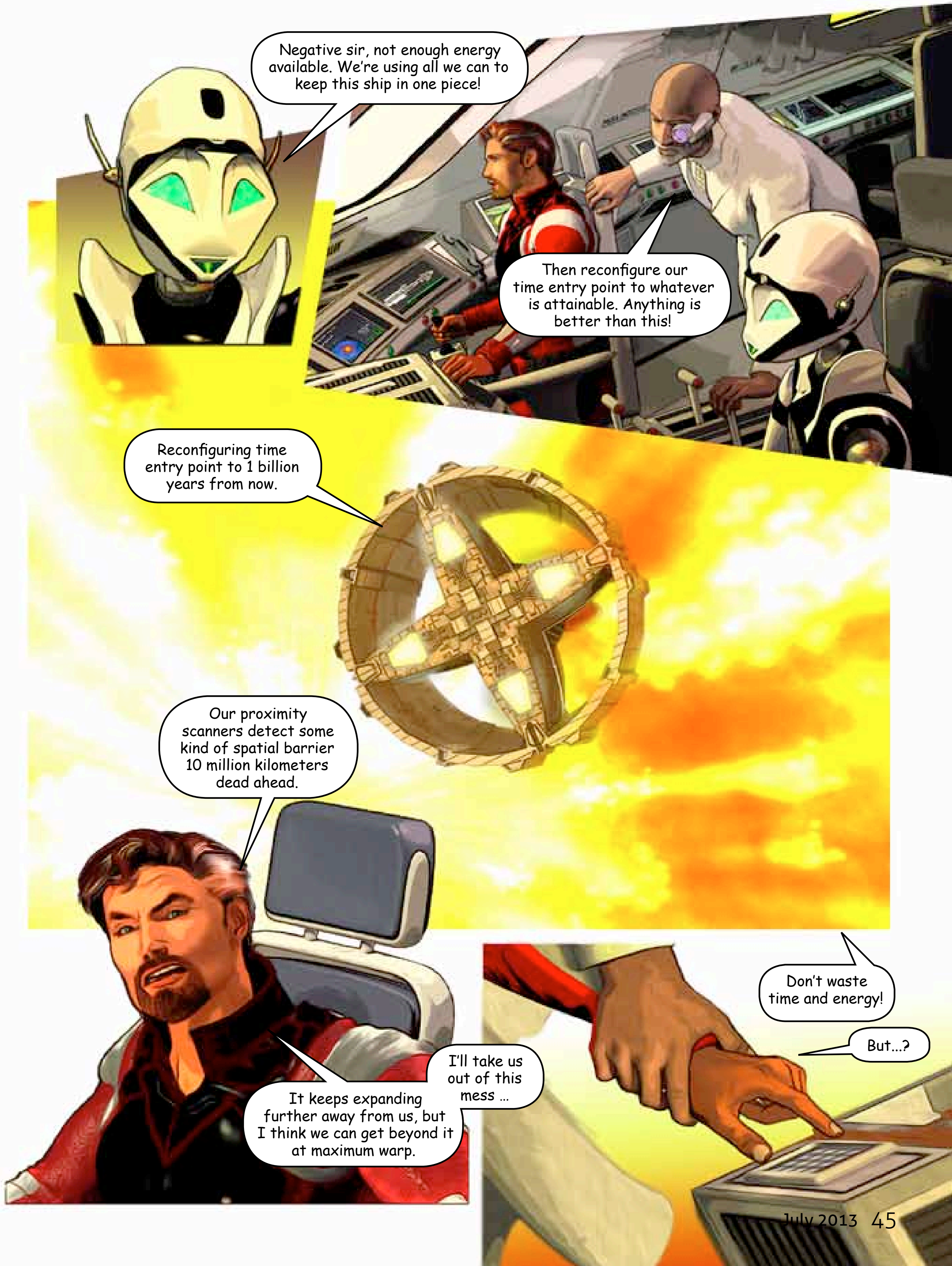
by Cobus Prinsloo

Episode 1
"In the Beginning"

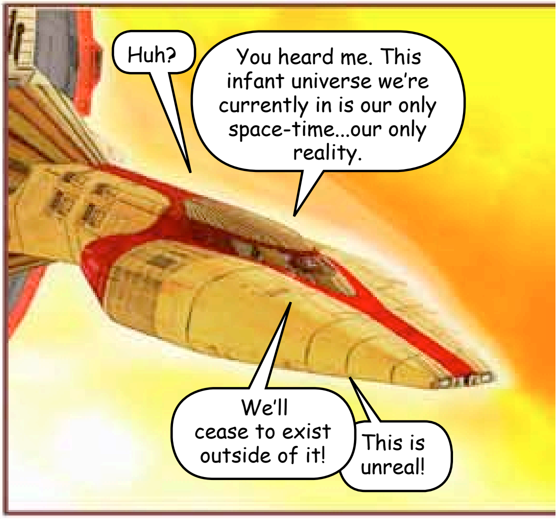

Quasar – how far are we from departure?
Somewhere above Earth, sometime in the future ...
"Big Bang"? Sounds rather ... catastrophic to me!
On the contrary Deon ... it was exactly the opposite.
Eh? Now you got me all confused, Prof!
It is not at all as you think, Deon – some chaotic explosion.
While we are waiting, let me give you a brief overview of what really happened. The term "Big Bang" was first mentioned in the 1960's by the astronomer Fred Hoyle, and believe me; he intended it in a disparaging way!
Have a look at this hologram. As evidence mounted through the 1960's for an expanding universe, and all its implications, amongst others, that it must have had a beginning, Hoyle, who supported the "steady state" theory, attempted to ridicule this new challenge to his theory.

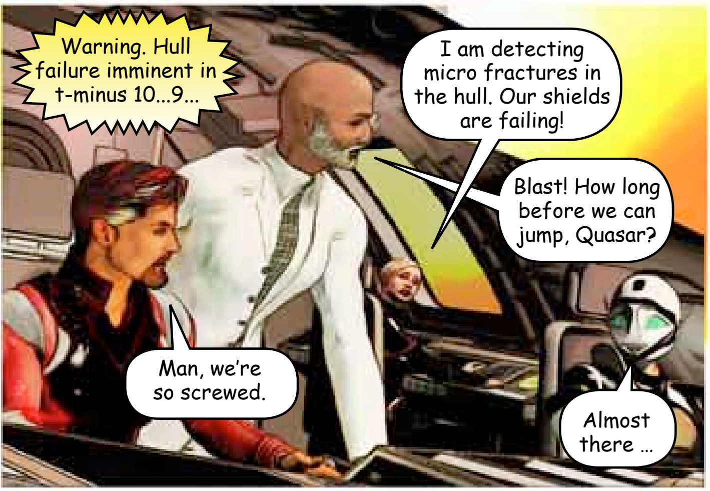

I just can't wait to embark on our first mission to observe the first stage of star formation one billion years after the "Big Bang" event of our universe.
Just a few more minutes, Professor.
I take it you mean by "steady state", a universe which had always ... existed?
Spot-on, Liz! Nicknames tend to stay. Even today people still refer to the "Big Bang", although this term is associated with a destructive explosion, which is far from the truth in this case.
Sorry to interrupt Professor ... all systems diagnostics are completed, we are ready to disengage.
Mission control ... requesting permission to undock.
"Permission granted TG1, and good luck with your maiden voyage!"
Setting entry point in timeline to 1 billion years after the Big Bang.
Ok. We are going to enter the stage when the universe consists mainly of light elements, helium and hydrogen gas, which will start to coalesce to form giant clouds that will become galaxies.
These will eventually become the first stars, which in turn will pull together to form the first galaxies.

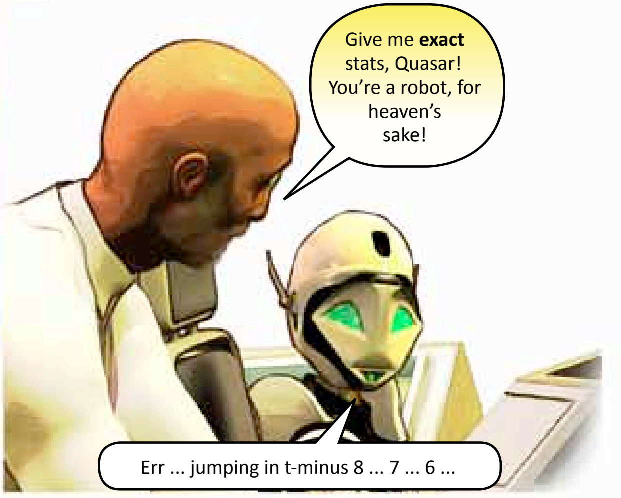

"Cleared for launch, Prof!"
"Good. Initiate artificial wormhole."
"Wormhole stable. Standby. Engage!"
... but the moment they enter the new time frame, they get a nasty surprise ...
Woooaaw – what the...? Something's wrong!
Our ship can't withstand this energy bombardment. Deon – divert all energy reserves to maximise shields – quick!
On it!
Prof! I see we have arrived too early, a mere 300 000 years after inflation!
No kidding! We are right inside super-hot plasma radiation at 10 000 °C – the conditions typical of our infant universe!
Quasar – can you get us back to our time...and how soon?

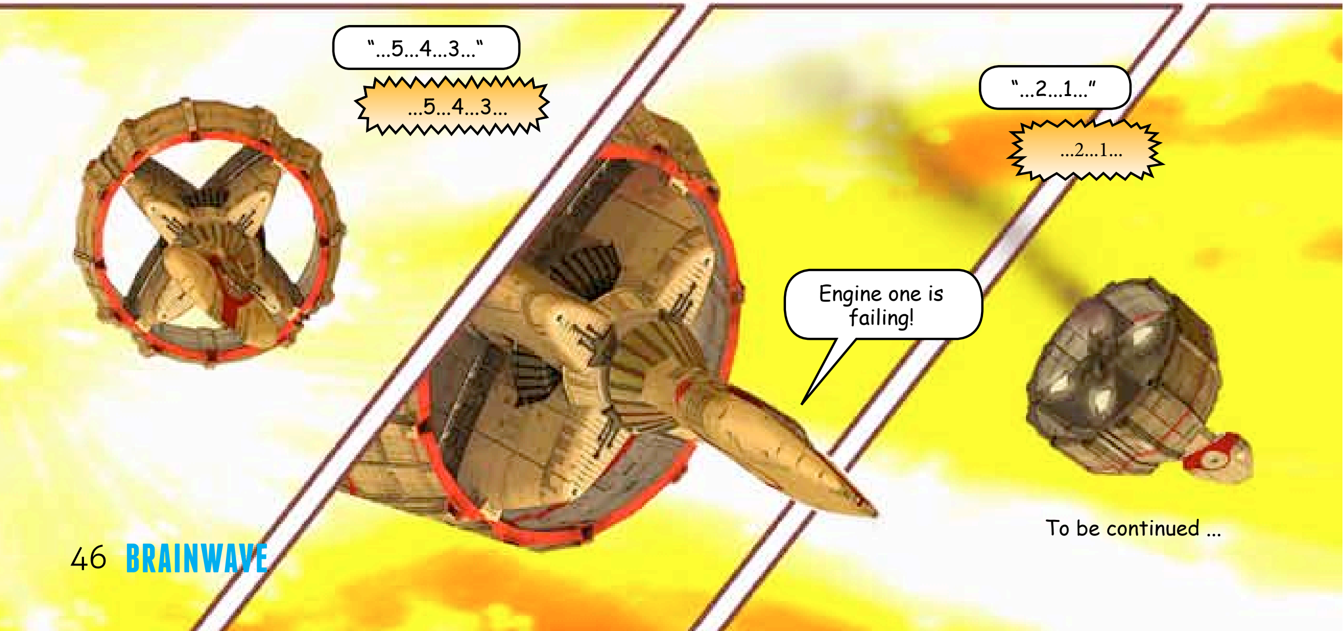

Negative sir, not enough energy available. We're using all we can to keep this ship in one piece!
Then reconfigure our time entry point to whatever is attainable. Anything is better than this!
Reconfiguring time entry point to 1 billion years from now.
Our proximity scanners detect some kind of spatial barrier 10 million kilometers dead ahead.
It keeps expanding further away from us, but I think we can get beyond it at maximum warp.
I'll take us out of this mess ...
Don't waste time and energy!
But...?

Outside this plasma radiation there is nothing!
Exactly my point, we'll get back to empty space.
You don't understand. There is NOTHING – not even space! We'll never be able to get out.


Huh?
You heard me. This infant universe we're currently in is our only space-time...our only reality.
We'll cease to exist outside of it!
This is unreal!
...8...7...6...


Warning. Hull failure imminent in t-minus 10...9...
I am detecting micro fractures in the hull. Our shields are failing!
Blast! How long before we can jump, Quasar?
Man, we're so screwed.
Almost there ...


Give me **exact** stats, Quasar! You're a robot, for heaven's sake!
Err ... jumping in t-minus 8 ... 7 ... 6 ...


"...5...4...3..."
...5...4...3...
"...2...1..."
...2...1...
Engine one is failing!
To be continued ...

MIND GAMES

by **Kashmira Sarode**

Our brain is very powerful. Scientists are using its power to build various technological applications. If it all comes down to man vs. machine, who do you think will win?

If only I had a body

A brain can be taught, even if it is not in anybody's head! Kumar Venayagamoorthy, a professor of electrical and computer engineering at Clemson University in the US, wanted a system that could monitor data, learn from past mistakes and new information, plan for the future, anticipate problems and make decisions. The only system he could think of that came close to this level of efficiency was the brain. So he decided to grow one in his lab!

Prof. Venayagamoorthy and his team grew neurons in a dish containing electrodes. They then connected a computer to the living neurons of rodents. This 'living' brain cell network was then 'taught' how to respond to complicated data, the results of which were transferred into an artificial network. A computer that is able to think for itself sounds like a recipe for machines trying to take over the world!

Mind control

Maybe we can win that war against machines if we can control them with our mind. Samsung is currently developing a device that will allow us to check email or listen to music with the power of your thought.

They think that this will be of huge help to physically impaired people who will be able to communicate more easily if all they have to use is their brain. Eventually, Samsung hopes to change how we interact with our mobile devices.

In the research team's experiments so far, users have been able to achieve an accuracy ranging from 80 to 95 per cent! Looks like brain- controlled phones may be a possibility in a few years!

Artwork: Devashree Dhakras

Psychic abilities of computers

No amount of mind control is going to help us if machines can read our mind. Researchers at the University of California-Berkeley are developing computers that can identify us by our thoughts - instead of typing our password, we just need to 'think' our password, replacing passwords with 'passthoughts'!

Computers that recognize people by their brainwaves might seem like a futuristic fantasy, but experimental results suggest that that future is more realistic than we might have suspected.

Rather than being limited to ultra high-end, high-security systems, brainwave-based authentication could end up being as cheap.

Join the BW FUN-DO BAND

Win gifts throughout the year while you learn with fun!

Every month, the best team wins goodie-bags with posters, comics, CDs, cool BW friendship bands and more.

At the end of each year, the top 5 teams win the BW Fun-do Band 'Hall-of-Fame' certificates, mementos and t-shirts! The top most team will also win a rolling shield.

www.bwmag.in/fun-do-band

5 easy steps!

Step 1

Form a team with four other friends who are not subscribers of Brainwave.

Step 2

Give your team a name (e.g. The Smartensteins) and choose a captain.

Step 3

Email the full names of your team, members and captain to brainwave@ack-media.com

Step 4

Click on the website link that we email to each of you and register.

Step 5

As a team, perform DIY (P24), Toy Box (P8), Eye See (P27) and Magic Science (P35) every month. Submit your observations and start winning!

Go, gather your friends now and have five times the fun!

BW SCIENCE SUPERTEACHER

We all have teachers who inspire us to love science and to ask questions with an open mind. They could be at school or they could be friends and family members. Nominate them for the BW science super-teacher awards and let the world know about them!
If your nominee wins, you get a cool gift too!

Email their name and school along with 100 words on why you are nominating them to brainwave@ack-media.com

www.bwmag.in/bw-super-science-teacher-awards

The Leaf

by **Saudamini Tambay**

A leaf is a part of a plant that sometimes looks meaningless. But, it is actually a very important part.

Importance of leaves - leaves:

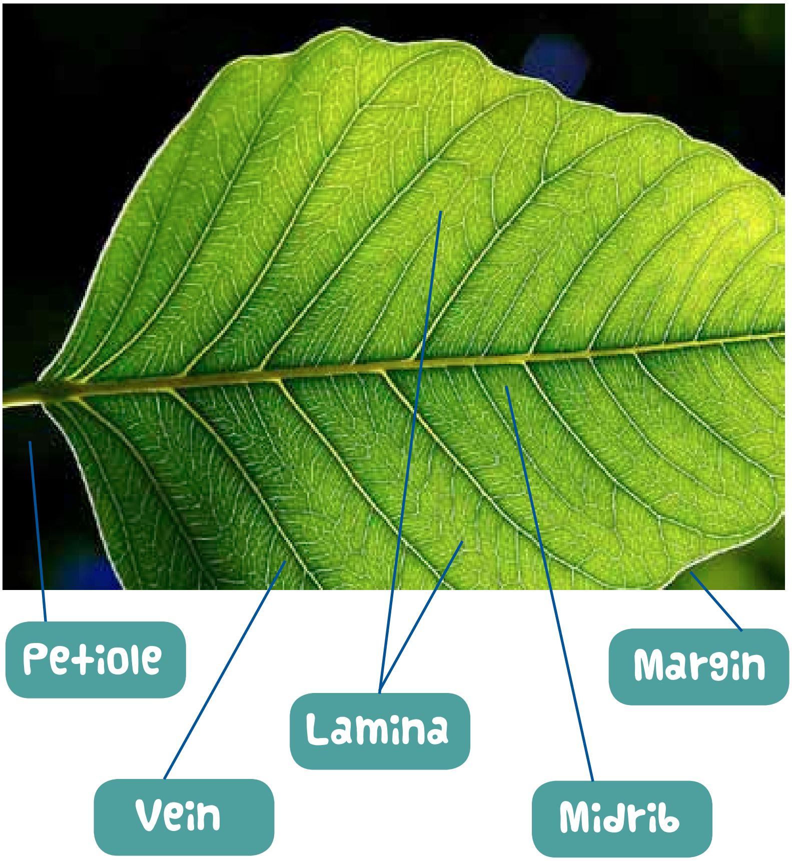
1. produce oxygen for animal respiration
2. remove carbon dioxide from the air
3. produce food for the plant
4. create shade
5. create hiding places for wildlife
6. are sources of food (for animals and people)
7. reduce soil erosion
8. lower the air temperature, as a by-product of transpiration

A leaf has many parts:

Vein
Lamina
Margin
Petiole
Midrib

Each part has its own function.

Your rask is to read, research and understand the above mentioned parts and their functions.



Photograph: Wikimedia Commons

Other things you can try:

1. Hold the leaves against light to see the veins clearly.

2. Get the impression of the veins by placing a white paper over the leaf and lightly running a pencil over it.

Note down your observations and email them to brainwave@ack-media.com with 'Eye See' as the subject. The most comprehensive research will give you a chance to be on our Student Board!

SCIENCE GLOSSARY

p12

Amphibians: Amphibian is the name of a group of animals - just like some are mammals or reptiles or birds. Amphibians are cold-blooded, live both in water and on land, and give birth by laying eggs. The babies are in different form than when they are fully grown. E.g.: frog (tadpole)

Cold-Blooded Animals: Animals that have a body temperature that varies with that of the surroundings. They cannot control their body temperature. They usually rely on the Sun to warm them up. During nights and winters, they become sluggish. These are also called ectotherms. E.g.: snakes and frogs.

p15

Inflation: Inflation is the rate at which the general level of prices of goods rises, and, subsequently, purchasing power falls. Central or Reserve banks attempt to stop severe inflation in an attempt to keep the excessive growth of prices to a minimum.

p321

GPS: GPS is short for Global Positioning System, is a space-based satellite navigation system that provides location and time information anywhere on the Earth.

The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver.

p35

Pollinate: Pollination is the process by which pollen is transferred from plant to plant to enable reproduction. Since plants cannot move, pollination is neccesary for them to reproduce. Birds are very important pollinators.

p37

Communicable: Transferrable from person to person or species to species. It is contagious.

Spot The Errors

Finished reading the magazine?

We have an innovative contest instead of a quiz this time. Win it and a mystery gift worth Rs. 500 is yours!

What you need to do:
There are a few mistakes in this magazine. They are either science or English grammer related. Identify as many of these as you can and email them to us at brainwave@ackmedia.com

Please ensure that you mention the page and paragraph numbers of each mistake.

To take part in some cool science initiatives, visit *www.bwmag.in*

Parents and teachers, here's something unique for you:
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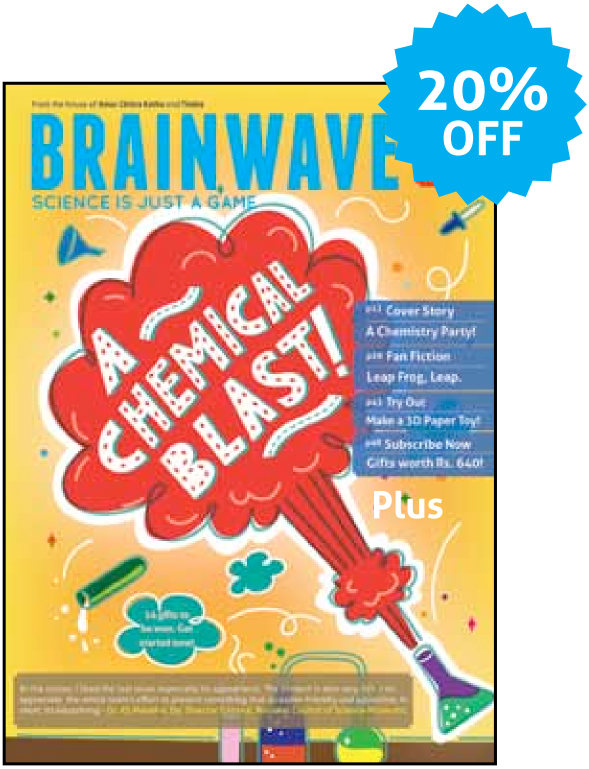

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Now, Brainwave is the perfect balance of science and fun, which will make you call your friends up and say, "Guys, let's play science!"

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